Detailed Environmental Scoping Assessment (ESA) Report for the Proposed Mineral Exploration on Exclusive Prospecting License (EPL) No. 7874 located west of Lüderitz in the //Karas Region, Namibia

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EXECUTIVE SUMMARY

Storm Two Mining CC (hereinafter referred to as *Storm Two Mining* or *the Proponent*) has been granted the Exclusive Prospecting License (EPL) 7874 (the *EPL*) by the Ministry of Mines and Energy (MME) with a tenure from 09 October 2020 to 08 October 2023. EPL 7874 is prospective to the following commodity groups, Base and Rare Metals, Precious Metals, Precious Stones and Semi-Precious Stones. The EPL 7874 (tenement) is located about 16 km west of Lüderitz in the //Karas Region and covers a total surface area of 1,700.8391 hectares (ha).

The Proponent intends to acquire an ECC to conduct prospecting and exploration activities of Base Metals, Rare and Precious Metals, Semi-Precious and as secondary, the Precious Stones.

Exploration and related activities are however some of the listed activities in the 2012 Environmental Impact Assessment (EIA) Regulations of the Environmental Management Act No. 7 of 2007 that that may not be undertaken without an Environmental Clearance Certificate (ECC). Subsequently, to ensure that the proposed activity is compliant with the governing (national and international) environmental legislation, the Proponent had to appoint an independent environmental consultant to undertake the required Environmental Assessment (EA) process and apply for the ECC on their behalf.

It is on this ground that Storm Two Mining appointed Excel Dynamic Solutions (Pty) Ltd to apply for the ECC and undertake the required EA to obtain the ECC for the project. The application for the ECC was compiled and submitted to the Competent Authority (Ministry of Mines and Energy (MME)). The date stamped copy of the ECC by MME was also uploaded on the online portal for the Ministry of Environment, Forestry and Tourism (MEFT) as the environmental custodian for project registration purposes. Upon submission of an Environmental Scoping Assessment Report and draft Environmental Management Plan (EMP), an ECC for the proposed project will be considered by the Environmental Commissioner at the MEFT's Department of Environmental Affairs and Forestry (DEAF).

Public Consultation and Potential Impacts

Regulation 21 of the EIA Regulations details steps to be taken during a public consultation process and these have been used in guiding this process. The public consultation process assisted the Environmental Consultant in identifying all potential impacts and aided in the process of identifying possible mitigation measures and alternatives to certain project activities. The communication with I&APs about the proposed ponds was done through the following means and

in this order to ensure that the public is notified and afforded an opportunity to comment on the proposed project:

- Registration of pre-identified stakeholders and interested & affected parties (I&APs) and updating the list throughout the environmental assessment process.
- A Background Information Document (BID) containing brief information about the proposed facility was compiled and hand delivered to relevant Authoritative Ministries.
- Project Environmental Assessment notices were published in *The Namibian newspaper* and the *New Era newspaper* dated 4 and 11 February 2021, briefly explaining the activity and its locality, inviting members of the public to register as I&APs and submit their comments/concerns.
- Public notices were placed at frequented places in Lüderitz town to inform members of the public of the EIA process and register as I&APs, as well as submit comments.
- Two public consultation meetings were held in Lüderitz on the 25th of February 2021 at the Turn Halle at two different time slots (First slot: 14:30, Second Slot 17:30). Requests for project registration (as an affected and interested party) were received in the form of emails, from some of the stakeholders. The issues, concerns, and inputs from stakeholders during the meetings and follow-up inputs were recorded and meeting minutes included in this Report.
- The issues/questions and responses raised and provided, respectively via emails during the consultation period and in the public meetings were recorded and presented under the respective sections of the Public Consultation Chapter (Chapter 6) and appendices.

Third Round of Public Consultation (Draft ESA Report Review)

The draft ESA Report was circulated to the registered I&APs for review and comments for a fifteen (15) day period, i.e., from the 1st of June to the 15th of June 2021. A 4-page letter containing comments/points was received by EDS from one I&AP dated 15 June 2021. Another letter of feedback was also received from the Ministry of Fisheries and Marine Resources (MFMR) dated 03 August 2021 – this letter was received late because MFMR also acted as a relevant competent authority due to the presence of a marine sensitive area in proximity of EPL7874, hence the need for a consent letter. Therefore, the draft ESA report had to be reviewed by different relevant persons within the ministry before responding to EDS.

The significant comments received were summarized and provided in full as received in Appendix J (original formats of comments received).

Potential Impacts identified

The following impacts were identified both by the Environmental Consultant with the public (I&APs) input, especially on the negative impacts:

Positive impacts:

- Potential for creation of temporary job positions for locals, especially the non-skilled labourers.
- Boost the local and regional economic development, i.e., economic diversification.
- May open other investment opportunities in the Region.
- Contribution to regional economic development.
- If mining commences (upon discovery of the economic feasibility of the target areas), the project will contribute to community development through community social responsibility (CSR).

The following potential negative impacts are anticipated:

- Physical land/soil disturbance
- Potential land use conflict (tourism, conservation, recreation, and exploration)
- Pressure on water resources (availability and use)
- Land Degradation and Loss of Biodiversity
- Dust Generation
- Waste Generation
- Impact on visual and tourism
- Potential Occupational Health and Safety Risks
- Possible disturbance Archaeological/Heritage Resources
- Noise and Vibrations from detailed exploration works, and
- Increase in Vehicular traffic flow.

The potential negative impacts were assessed, and mitigation measures provided accordingly.

Recommendations

The key potential impacts associated with the proposed exploration program and its associated activities on EPL were identified and assessed. It is found that most of the identified potential negative impacts are rated as medium significant and few of a medium high significance. Therefore, to reduce the project impact' significance from their pre-management/mitigation significance to a lower significance, it is recommended that the Proponent effectively implements

the recommended management and mitigation measures. Not only to implement the measures but also ensure continuous monitoring of the implementation and performance, to maintain an overall low significance. The negative impacts identified in this study can be avoided and minimised (where impacts cannot be avoided) by implementing the mitigation measures given under section 7 of this EA report, as well as those provided in the management action and monitoring plans provided in the Draft EMP.

A public consultation meeting in a form of two-slot interaction session was held with the public, specifically some of the affected and concerned community members on the 25th of February 2021 at Turnhalle in Lüderitz. The interested and affected parties raised their concerns, and submitted comments on the proposed project activities, and these were noted down during the meetings and follow-up email communications. The concerns and comments received from the public and the local community members formed the basis for this Report and development of the Draft EMP.

Two specialists' studies were conducted for this ESA to assist the Environmental Assessment Practitioner (EAP) in describing the respective baseline environments, assessing the impact, and recommending suitable management and mitigation measures. The two specialists' studies were for:

- **Archaeology** with the conclusion that the study relied on surface-based visual observation, which means that there is a possibility that sub-surface archaeological resources might be unearthed during the explorations. Thus, should any subsurface heritage resources be present the damage to archaeological resources will be extensive. Therefore, the Proponent is advised to implement the Chance Finds Procedure (CFP) management guideline: The EPL is an important mining infrastructure development area subject to heritage & archaeological assessment at the planning stage. These assessments were desktop based, and field surveys were carried out, therefore; significant subsurface heritage resources might be discovered. Onsite personnel and contractors must be sensitized to recognize "chance finds heritage" in the course of their work. The procedure set out here covers the reporting and management of such finds. The CFP covers the actions to be taken from the discovery of a heritage site or object to its investigation and assessment by a trained archaeologist. The CFP is intended to ensure compliance with the relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): "a person who discovers any archaeological objects must as soon as possible report the discovery to the council".

- **Ecology** (Vertebrate Fauna and Flora Expected to Occur in the EPL 7874) with the conclusion that it is not expected that limited exploration activities throughout the EPL 7874 area will adversely affect any unique vertebrate fauna and flora, especially if the proposed recommendations (mitigation measures) are incorporated. However, as EPL 7874 spans very important vegetation types with numerous unique species (including vertebrate fauna), it is recommended that fieldwork be conducted to confirm and/or identify patches of unique species to be avoided/removed, etc. before prospecting commences.

It is therefore recommended that an Environmental Clearance Certificate be issued for the proposed exploration on EPL 7874, subject to the following recommendations:

- All management and mitigation measures recommended by the specialists (for the sensitive environmental components) are effectively implemented and monitored accordingly.
- All management and mitigation measures provided in this Report (in addition to specialists' specific recommendations) and the management action plans in the Draft EMP should be implemented and monitoring conducted as recommended.
- All required permits, licenses and approvals for the proposed activities should be obtained as required (please refer to the Permitting and Licensing Table in the Environmental Management Plan (Appendix B). These include permits and licenses for land access and permission to perform exploration activities in the park as per the Tsau //Khaeb National Park Management Plan of 2012-2018, prohibited/no-go areas on the Peninsula and other sensitive areas marked inside the EPL boundaries (**Figure 29** of this Report) as well as ensuring compliance with all these specific legal requirements.
- The Proponent should comply with the operational rules and regulations of the Tsau //Khaeb National Park (The Park's EMP of 2013-2018) throughout the duration of the prospecting and exploration works.
- All the necessary environmental and social (occupational health and safety) precautions provided should be adhered to.
- Site areas where exploration activities such as excavated pits and drilled boreholes have ceased should be rehabilitated, as far as practicable, to their original state.
- The monitoring of the implementation of management and mitigation measures should be conducted, applicable impact's actions taken, reporting done and recorded as recommended in the Draft EMP.

Conclusion

The potential positive and negative impacts stemming from the proposed exploration activities were identified, assessed and mitigation measures made thereof. The management and mitigation measures recommended in this report and management action plans and as provided in the draft EMP, can be deemed sufficient to avoid and/or reduce (where impact avoidance impossible) the risks to acceptable levels.

Excel Dynamic Solutions (Pty) Ltd is, therefore, confident that the anticipated potential negative impacts stemming from the exploration activities, specifically the detailed exploration (invasive methods) will be of short-term duration and the effective implementation of management and mitigation measures provided thereto are sufficient. And, and thus EDS recommends that an Environmental Clearance Certificate (ECC) may be issued to the Proponent to enable the prospecting and exploration works on the EPLs. However, to ensure that the Proponent approaches the project with caution and abides to the effective implementation and monitoring of management and mitigation measures provided hereinto each potential impact, the ECC should be issued on condition that the provided management measures and action plans are effectively implemented and monitored on site. Monitoring of the environmental components described in the impact assessment should be conducted by the Proponent and applicable Competent and Affected Authorities such as the Ministry of Environment, Forestry and Tourism (Parks Division), Ministry of Mines and Energy (MME) as well as Ministry of Fisheries and Marine Resources (MFMR). This will be done to ensure that all potential impacts identified in this herein and other these that impacts that might arise during project activities' implementation are well identified in time and properly addressed. Lastly, should the ECC be issued, the Proponent will be expected obliged to be compliant with the ECC conditions, other conditions set by other governmental institutions (such as MME and MFMR) as well as other legal requirements governing the mineral prospecting and exploration and related activities.

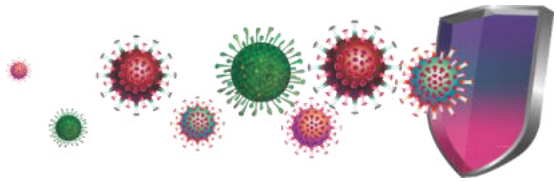
Limitations

EDS warrants that the findings and conclusion contained herein were accomplished in accordance with the methodologies set forth in the Scope of Work and Environmental Management Act (EMA) of 2007. These methodologies are described as representing good customary practice for conducting an Environmental Impact Assessment of a property for the

purpose of identifying recognized environmental conditions. There is a possibility that even with the proper application of these methodologies there may exist on the subject property conditions that could not be identified within the scope of the assessment, or which were not reasonably identifiable from the available information. The Consultant believes that the information obtained from the record review and during the public consultation processes concerning the proposed exploration work is reliable. However, the Consultant cannot and does not warrant or guarantee that the information provided by the other sources is accurate or complete. The conclusions and findings set forth in this report are strictly limited in time and scope to the date of the evaluations. No other warranties are implied or expressed.

Some of the information provided in this report is based upon personal interviews, and research of available documents, records, and maps held by the appropriate government and private agencies. This report is subject to the limitations of historical documentation, availability, and accuracy of pertinent records and the personal recollections of those persons contacted.

COVID-19 Influences:



COVID-19 has changed the way the world thinks, acts, and does business. The pandemic has forced a comprehensive review of business practices, a higher level of engagement with technology to offset the constraints due to social distancing, restrictive travel, and a focus on social responsibility. The Consultant had to change very little in the way they operate and provide public consultation services.

Although the Consultant operated with limited attendees at the meetings during the environmental assessment to comply with the measures and regulations put in place to curb the spread of Covid-19, various other platforms were also used to communicate the project information. These platforms included emails, notices, newspaper adverts, and telephonic communication.

The Consultant practices included but are not limited to:

- Social distancing was strictly enforced when on project site, face masks worn by members during site assessment visits, and regular hand - sanitizing/washing.

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Appendix F: List of Interested and Affected Parties (I&APs) - **uploaded separately as per the ECC System/Portal Requirement (under ''Proof of Public Consultation documents'')**

Appendix G: Background Information Document (BID) - **uploaded separately as per the ECC System/Portal Requirement (under ''Proof of Public Consultation'' documents)**

Appendix H: EIA Notification in the newspapers (*New Era* and the *Namibian*) & Site Notices - **uploaded separately as per the ECC System/Portal Requirement (under ''Proof of Public Consultation'' documents)**

Appendix I: Meeting minutes and summary of key concerns highlighted (Part of First Round of Consultation)- **uploaded separately as per the ECC System/Portal Requirement (under ''Proof of Public Consultation'' documents)**

Appendix J: Second Round of Consultation (I&APs' Response (after the Public Meeting)) - **uploaded separately as per the ECC System/Portal Requirement (under ''Proof of Public Consultation'' documents)**

Appendix K: Third Round of Consultation (I&APs' Response to the Draft ESA Report (comments received)) - **uploaded separately as per the ECC System/Portal Requirement (under ''Proof of Public Consultation'' documents)**

LIST OF ABBREVIATIONS

Abbreviation	Meaning
AMSL	Above Mean Sea Level
BID	Background Information Document
BCLME	The Benguela Current Large Marine Ecosystem
CV	Curriculum Vitae
DEA	Department of Environmental Affairs
EA	Environmental Assessment

Abbreviation	Meaning
EAP	Environmental Assessment Practitioner
EBSA	Ecologically or Biologically significant Marine Area
ECC	Environmental Clearance Certificate
EDS	Excel Dynamic Solutions (Pty) Ltd (The Environmental Consultant)
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
EPL	Exclusive Prospecting License
GG	Government Gazette
GN	Government Notice
I&APs	Interested and Affected Parties
MEFT	Ministry of Environment, Forestry and Tourism
MFMR	Ministry of Fisheries and Marines Resources
MME	Ministry of Mines and Energy
NIMPA	Namibian Islands Marine Protected Area
PPE	Personal Protective Equipment
Reg / S	Regulation - Section
SASSCAL	Southern African Science Service Centre for Climatic Change and Adaptive Land Management
TOR	Terms of Reference

KEY TERMS

Alternative	A possible course of action, in place of another that would meet the same purpose and need of the proposal.
Baseline	Work done to collect and interpret information on the condition/trends of the existing environment.

Biophysical	That part of the environment that does not originate with human activities (e.g., biological, physical, and chemical processes).
Cumulative Impacts/Effects Assessment	In relation to an activity, means the impact of an activity that in it may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
Decision-maker	The person(s) entrusted with the responsibility for allocating resources or granting approval to a proposal.
Ecological Processes	Processes which play an essential part in maintaining ecosystem integrity. Four fundamental ecological processes are the cycling of water, the cycling of nutrients, the flow of energy and biological diversity (as an expression of evolution).
Environment	As defined in Environmental Management Act - the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including – (a) the natural environment that is land, water, and air; all organic and inorganic matter and living organisms and (b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage, and values.
Environmental Management Plan	As defined in the EIA Regulations (Section 8(j)), a plan that describes how activities that may have significant environments effects are to be mitigated, controlled, and monitored.
Exclusive Prospecting Licence	Is a license that confers exclusive mineral prospecting rights over land of up to 1000 km^2 in size for an initial period of three years, renewable twice for a maximum of two years at a time
Interested and Affected Party (I&AP)	In relation to the assessment of a listed activity includes - (a) any person, group of persons or organization interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity. Mitigate - practical measures to reduce adverse impacts. Proponent – as defined in the Environmental Management Act, a person who proposes to undertake a listed activity. Significant impact - means an impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

Fauna and Flora	All the animals (fauna) and plants (flora) found in an area.
Mitigation	The purposeful implementation of decisions or activities that are designed to reduce the undesirable impacts of a proposed action on the affected environment.
Monitoring	Activity involving repeated observation, according to a pre-determined schedule, of one or more elements of the environment to detect their characteristics (status and trends).
Nomadic Pastoralism	Nomadic pastoralists live in societies in which the husbandry of grazing animals is viewed as an ideal way of making a living and the regular movement of all or part of the society is considered a normal and natural part of life. Pastoral nomadism is commonly found where climatic conditions produce seasonal pastures but cannot support sustained agriculture.
Proponent	Organization (private or public sector) or individual intending to implement a development proposal.
Public Consultation/Involvement	A range of techniques that can be used to inform, consult, or interact with stakeholders affected by the proposed activities.
Protected Area	Refers to a protected area that is proclaimed in the Government Gazette according to the Nature Conservation Ordinance number 4 of 1975, as amended.
Scoping	An early and open activity to identify the impacts that are most likely to be significant and require specialized investigation during the EIA work. Can, also be used to identify alternative project designs/sites to be assessed, obtain local knowledge of site and surroundings, and prepare a plan for public involvement. The results of scoping are frequently used to prepare a Terms of Reference for the specialized input into full EIA.
Terms of Reference (ToR)	Written requirements governing full EIA input and implementation, consultations to be held, data to be produced and form/contents of the EIA report. Often produced as an output from scoping.

1 INTRODUCTION

This chapter of the report provides the project background, location, motivation to the project (need and desirability), the need for the environmental assessment, terms of reference, purpose of the report and an outline of the rest of the report's contents.

1.1 Project Background and Location

Storm Two Mining CC (hereinafter referred to as The Proponent), a holder of the Exclusive Prospecting Licence (EPL) No 7874, granted by the Ministry of Mines and Energy (MME), intends to acquire an ECC to conduct prospecting and exploration activities on the EPL. The tenure of the EPL is from 9 October 2020 to 8 October 2023. The total surface area covered by EPL 7874 is 1,700.8391 hectares (ha). The Proponent's primary focus on the EPL is on the acquisition, exploration, and development of Base Metals, Rare and Precious Metals, Semi-Precious and as secondary, the Precious Stones. The EPL is located about 16 km stretching from west to southwest of Lüderitz (**Figure 1**) and in one of the national parks, the Tsau //Khaeb National Park formerly known as the Sperrgebiet that was proclaimed in 2008. This Park is also known as the Restricted Diamond Area and an environmentally sensitive area of the Namib Desert. The Tsau //Khaeb Park stretches from the southern border of the Namib Naukluft Park to the Orange River, the border of Namibia and South Africa and covers an area of 22,000 km².

1.2 EPL 7874 Ownership

The EPL on which the exploration activities are proposed to be undertaken is owned by Storm Two Mining CC. The application for the EPL was granted on the 9th of October 2020 and expires on the 8th of October 2023. However, in addition to the EPL approval by MME, the intended exploration works on the EPL are subject to an environmental clearance certificate (ECC) by MEFT.

The status of EPL 7874 at MME is shown on the Namibia Mining Cadastral Portal (upon searching) on this link https://portals.landfolio.com/namibia/ and as shown on the mining portal in **Figure 2**.

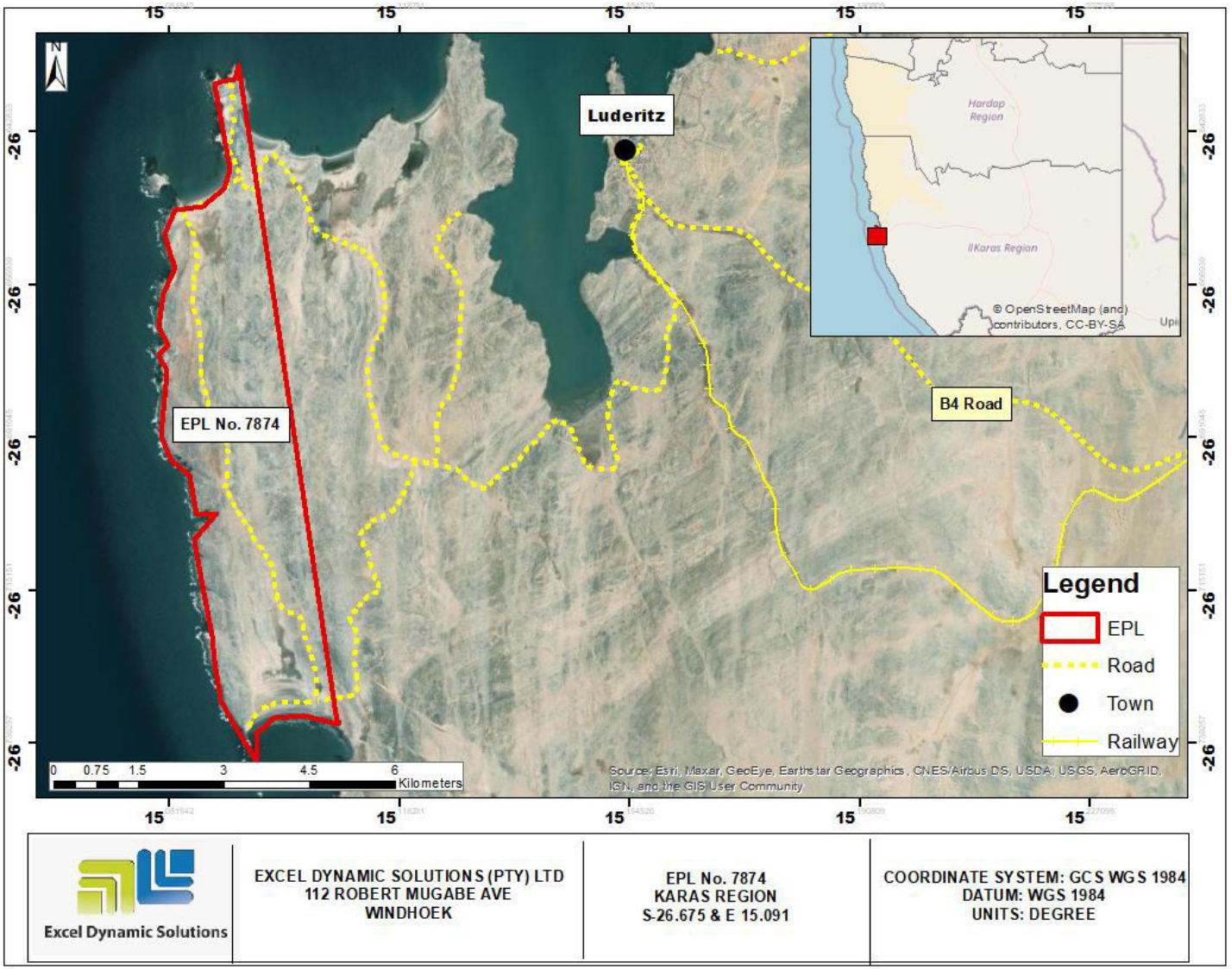


Figure 1: Location of the EPL No. 7874 near Lüderitz in the //Karas Region

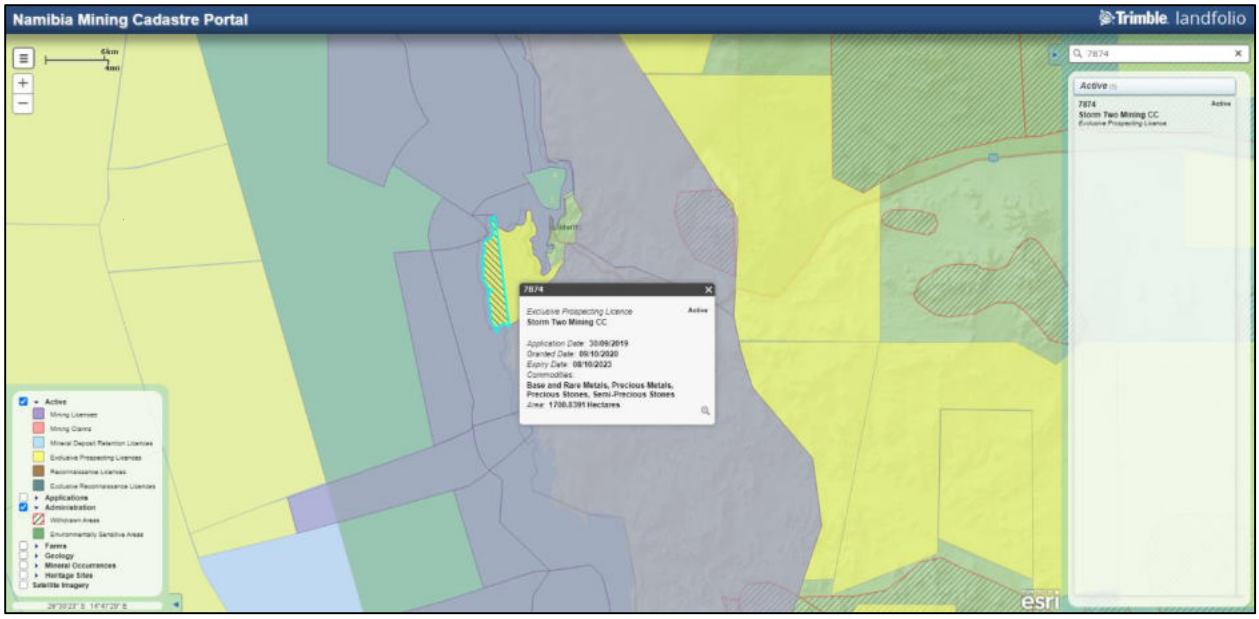


Figure 2: EPL No. 7874 on the mining cadastre portal (source: https://portals.landfolio.com/namibia/)

1.3 The Need for the Proposed Project

Mining is essential in meeting the ever-increasing demand for minerals for the world's growing population and prosperity. Mining has been one of the largest contributors to the Namibian economy; therefore, the mining industry contributes to the improvement of livelihoods. In Namibia, exploration for mining occurs mainly within the private sector and it has great potential to enhance and contribute to the development of other sectors.

The inevitable volatility within the market of one commodity or the other in the medium to long-term (i.e., approx. 10 years) may potentially exceed supply. Is therefore crucial for prospecting and exploration works be planned for and undertaken. The proposed exploration activities within the EPL seek to identify potential economic stone and metals' mineralisation, which will require feasibility studies and if proven to be economic aid in mine planning. Future exploration programmes will utilise this information to enable a more effective and efficient exploration targeting and potential mining of any identified target deposits in future.

Detailed geological information within the EPL is required with respect to commodities' deposits. Depending on the geological data obtained during the exploration process, this will be made available to the Ministry of Mines and Energy (MME).

The mining sector forms the vital part of some of Namibia's development plans, namely: Vision 2030, National Development Plan 5 (NDP5) and Harambee Prosperity Plan (HPP). Thus, mining is essential to the development goals of Namibia in contributing to meeting the ever-increasing global demand for minerals, and for national prosperity. Partaking of the local organisations/groups in the mining sector would enhance the already existing mining activities in the //Karas region and provide employment opportunities to local people of Lüderitz. As a portable repository of value, precious stones, precious metals, semi-precious stones, and base and rare metals would contribute greatly to the generation of foreign currency and positively contribute to the national GDP. This in turn, can support the aim of achieving a balance between the establishment and dissemination of wealth. The project is expected to generate full time, short to medium term direct employment for at least 10 people.

It is therefore both necessary and desirable to carry out prospecting and exploration of precious and semi-precious stones as well as base, rare and precious metals and their potential mining within the areas covered by the EPL has the potential to contribute to both national priorities as well as local and regional benefits.

1.4 The Need for an Environmental Assessment and Process

Section 27 (1) of the Environmental Management Act (EMA) (No. 7 of 2007) and its 2012 Environmental Impact Assessment (EIA) regulations, provides a list of activities that may not be carried out without an Environmental Impact Assessment (EIA) being undertaken and an Environmental Clearance Certificate (ECC) obtained (refer to Section 4.1), GN. No. 29 of 2012. Exploration activities are listed among the activities that may not occur without an ECC. Therefore, individuals or organizations may not carry out exploration activities among those listed, without an EIA undertaken and an ECC awarded.

1.5 Registration of Application for Environmental Clearance Certificate

The first step followed as part of this EA process was to identify the listed activities, which the proposed project entails, as stipulated in the 'List of Activities that may not be undertaken without an ECC. One listed activity, listed below, was identified.

Mining and Quarrying Activities

3.1 The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992.

In accordance with Section 32 of the EMA, applications for an ECC should be submitted to the relevant Competent Authority. The Competent Authority is defined as that authority having the jurisdiction to approve or permit a particular listed activity in accordance with the relevant national legislation. The Ministry of Mines and Energy (MME) was identified as the Competent Authority. Therefore, the application for an ECC was submitted on 05 March 2021 to the MME (**Appendix A**) and a copy of the same application submitted on the same day to the Environmental Commissioner (**Appendix A**) as prescribed by Regulation 6 (Form 1 of Annexure 1) of the EIA Regulations (GN. No. 30 of 2012), as provided for under Section 56 of the EMA. The copy of the ECC application to the Environmental Commissioner has been submitted/uploaded on the Ministry of Environment and Tourism and Forestry's ECC Portal.

1.6 Terms of Reference and Scope of Works

There were no formal Terms of Reference (ToR) provided to EDS by the Proponent. The consultant, instead, relied on and was by guided the requirements of the Environmental Management Act (No. 7 of 2007) (EMA) and its Environmental Impact Assessment (EIA) Regulations (GN. No. 30 of 2012) to conduct the environmental assessment.

After applying for an ECC under section 1.4.1, the scoping/assessment phase commenced, culminating in the compilation of a draft environmental scoping assessment report (i.e., this document), which includes all the findings of the scoping phase. The contents of the report are as follows:

- A description of the proposed project under Chapter 2,
- Project alternatives considered, in terms of no-go/action, location, exploration method techniques and services infrastructure - Chapter 3,
- Legislative provisions that have relevance to the proposed project (Chapter 4),
- A description of the existing biophysical and social conditions of the receiving environment (baseline) - Chapter 5,
- A description of the public consultation process followed (as described in Regulations 7 and 21 of the EIA Regulations) - Chapter 6,

- Impact identification, description, and significance assessment of all identified potential impacts (positive and negative) associated with the proposed project (Chapter 7), and
- Management and mitigation measures (in a form of action plans) required to avoid or minimise the potential negative impacts as outlined in the Draft Environmental Management Plan (EMP) – **Appendix B**.

The purpose of this draft EA report is to provide all affected authorities and registered I&APs with feedback on the EA process conducted to date, which includes providing a summary of the findings of the impact identification and assessment process. This draft document also presents the I&APs an opportunity to review the document to ensure that their inputs (comment/concerns) are included and addressed and submit further comments on the EA and draft report.

1.7 The Appointed Environmental Assessment Practitioner (Independent Consultant)

To satisfy the requirements of the EMA and its 2012 EIA Regulations, the Proponent has appointed thereupon, Excel Dynamic Solutions (Pty) Ltd (EDS, Consultant or Environmental Assessment Practitioner (EAP) hereafter), an independent team of Environmental Consultants to conduct the required Environmental Assessment (EA) process and submit the ECC application to the Ministry of Environment, Forestry and Tourism (MEFT) and the Ministry of Mines and Energy (MME) on their behalf. The findings of the EA are incorporated into this report, and the potential impacts' management and mitigation measures presented in the draft EMP - (**Appendix B**). The two documents will be submitted as part of an application for an ECC to the Environmental Commissioner at the Department of Environmental Affairs and Forestry (DEAF), MEFT and the Ministry of Mines and Energy (MME).

The EIA project is headed by Mr. Nerson Tjelos, a qualified and experienced Geoscientist and experienced EAP. The consultation process and reporting are conducted by Ms. Althea Brandt and Ms. Rose Mtuleni and reviewed by Mr. Tjelos and Ms. Fredrika Shagama. The CV for Mr. Tjelos is presented in **Appendix C.**

It should be noted that this document has been solely **prepared for the** environmental assessment (EA) of **prospecting and exploration** phase activities on EPL 7874 as described under Chapter 2. In other words, this EA is not for **subsequent potential** phases **such as** mine development and **mining (if exploration yields favourable results, i.e., a verified economic feasibility on certain site areas of the EPL).** Should selected site areas of the EPL provide results of economic value and the EPL converted into a mining license by MME, a separate and detailed environmental assessment (full EIA) will need to be undertaken for this phase and a separate ECC applied for and obtained from the Environmental Commissioner.

2 PROJECT DESCRIPTION: PROPOSED EXPLORATION ACTIVITY

The description of the prospecting and mineral exploration activities, resources, methods, and processes required for the project are described under this chapter (from section 2.1 to 2.4). The project activities will commence after issuance of the ECC by the Environmental Commissioner. The planned exploration activities are aimed at delineating the mineral deposits and determine whether the deposits are economically feasible mining resources.

The proposed prospecting and exploration phase on EPL 7874 is anticipated to last for about ten (10) months. The primary minerals for this exploration are Base Metals, Rare and Precious Metals and Semi-Precious stones. The secondary mineral interest of the exploration work is Precious Stones (diamond). **Although diamonds are one of the sought-after commodities on the EPL (but as secondary), there will be no fencing off the EPL area or its parts as it would be the case if diamonds were the primary commodities of interest (fencing off the area as required by the Diamond Act No. 13 of 1999) and this would only be done for actual mining, which is not the case with this ESA Study. In other words, the ESA Study is for exploration activities only.**

Due to the iterative, results-driven, and phased nature of mineral exploration programmes, it is not possible at an early stage of exploration to give exact areas for future drilling or an exact duration of the exploration activities. According to Resilient Environmental Solutions (2019), soil sampling programmes may last from between one week to one month at a time over specific areas until the area has been fully explored. Drilling programmes may initially range from two weeks to a month at a time, depending on the planned programme or based on the results of the

programme. In general terms, the minerals exploration activities can take up to a maximum of seven years, with different projects at various stages of the exploration phase.

The Proponent will commit to work with all relevant stakeholders to keep them informed of exploration progress to facilitate site visits and access to ongoing field exploration programmes.

The prospecting and exploration of minerals are the first components of any potential mining project (development and eventual mining), and this is shown in the general mine life cycle in **Figure 3** below, while the typical mineral exploration cycle is shown in **Figure 4**.

Figure 3: Diagram of the Life Cycle of a Mine (after Superfund Research Project, 2019). The phase covered by this study is highlighted with a red box.

2.1 Pre-Prospecting Activities

Before carrying out activities that require the Proponent or their employees and or contractors to be onsite, the following need to be undertaken.

2.1.1 Consultation (Liaison) with Landowners and or Authority for Permitting

Consultations with all the landowners, users and community and government stakeholders will commence to introduce the Proponent, to explain the purpose and stage of the proposed exploration, determine the current operating procedures and rules of the park (area), and to develop land access and operational agreements with the governing authority and or user. In this case of the EPL and activities proposed to be undertaken in a national park, an access and operation (exploration) permit will need to be applied for and obtained from the Parks Division of MEFT.

2.1.2 The Minerals Act: Land Use and Permitting

The Proponent is required to secure a signed agreement from the affected landowners or occupiers of land (if any) and in this case, the custodian of the National Park to gain access to the areas of interest for prospecting and exploration investigations as per the Section 52 of the Minerals (Prospecting and Mining) Act No. 33 of 1992 and Section 2.2.3 of the Minerals Policy of Namibia.

1. *Section 52 (1) The holder of mineral licence shall not exercise any rights conferred upon such holder by this Act or under any terms and conditions of such mineral licence –*

    (a) In, on or under any and until such time as such holder has entered into an agreement in writing with the owner of such land containing terms and conditions relating to the payment of compensation, or the owner of such land has in writing waked any right to such compensation and has submitted a copy of such agreement or waiver to the Commissioner.

Section 2.2.3 of the Draft Minerals Policy of Namibia states that the Licence Holder and/or mineral explorers currently must negotiate a contract with landowners to gain access for or mining purposes.

2.1.3 Induction on Health and Safety

Before any work is carried out all personnel (including fully employed, contracted, and casual) will be inducted on the Proponent's Environmental, Health and Safety policy and procedures and processes to follow while conducting the work.

2.2 Planned Activities: Proposed Exploration Methods

The project will include a variety of exploration techniques, described in the following sections. The early phase, regional exploration, normally comprises a mixture of non-invasive techniques such as soil sampling and ground geophysics and invasive drilling techniques. During these early phases, all the Proponent's employees and contractors will employ industry standard best practice techniques and will incorporate the taking of 'before' and 'after' photographs. This photographic record will be included in annual environmental monitoring reports to show the minimum impact and environmental best practice that is adopted by the Proponent and all sub-contractors, as well as provide a record for the Department of Environmental Affairs and Forestry (DEAF) and Interested and Affected Parties (I&APs).

As mentioned above, the summary of the systematic prospecting approach to be adopted by the Proponent is as follows:

- **Non-invasive techniques**: Geological mapping, remote sensing (satellite imagery), reviewing of existing geological maps and historical drilling data, Field evaluation and sampling – described under section 2.4; and
- **Invasive techniques**: Soil and rock sampling, pitting and detailed exploration by Reverse Circulation (RC) and infill drilling) - section 2.5).

2.3 Pre-development Phase (Prospecting)

From the early stage of the exploration phase, all the Proponent's employees and contractors will employ industry standard best practice techniques and will incorporate the taking of 'before' and 'after' photographs. This photographic record will be included in annual environmental monitoring reports to show the minimum impact and environmental best practice that is adopted by the Proponent and all sub-contractors, as well as provide a record for the Department of Environmental Affairs and Forestry (DEAF) and Interested and Affected Parties (I&APs).

2.4 Prospecting Work: Non-Invasive

During the prospecting and exploration phase, reviewing of existing reports and composite stratigraphic, lithological-geochemical maps of the targeted areas to identify prospective

lithostratigraphic packages will be vital. In addition to literature review, fieldwork (lithological (soil/rock) mapping and sampling) will be conducted to verify desktop work. Up to this point no physical disturbance is required. Prospecting during the advanced exploration phase will require the Proponent to assess the license area through detailed geological mapping, geophysical and geochemical surveys, supported where necessary by geophysical surveys, with a view to define targets for test drilling. Upon issuing of the ECC, the exploration program will commence with ground geophysical surveys.

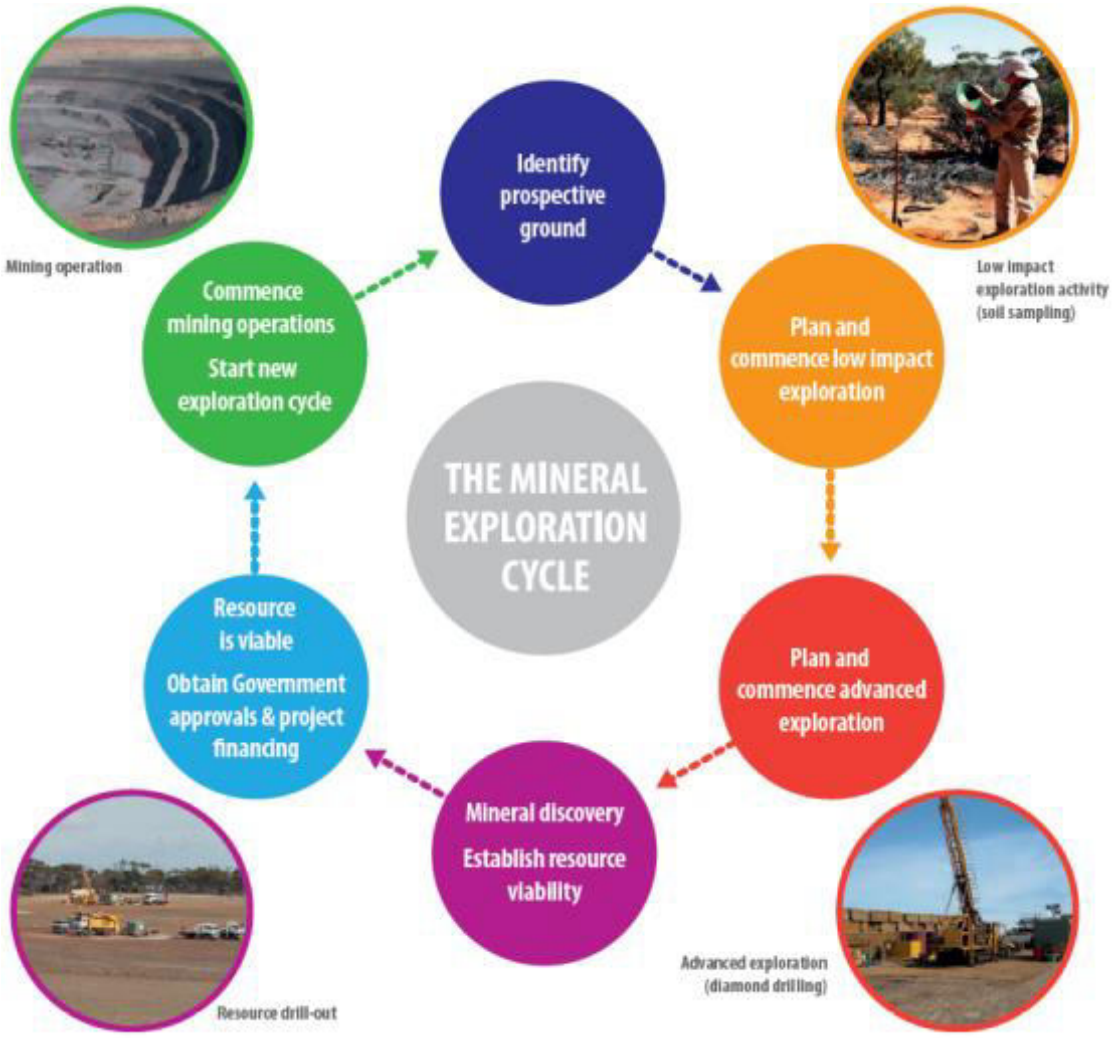


Figure 4: The mineral exploration cycle (after, Savannah Resources, 2019)

It should be noted that the satellite imagery will be used to determine the area of the EPL that will need drilling. Only upon ascertaining the presence of the mineral deposit will drilling be carried out on selected site area. In other words, there will be no drilling activities until hotspots (verified and worthy targets) are identified from remote sensing mapping which is non-invasive.

2.5 Detailed Exploration (Invasive): Drilling, Sampling and Analysis Phase

This is the operational phase of the exploration program. The Proponent has highlighted that both invasive and non-invasive exploration activities are expected to take place upon issuance of an ECC. Non-invasive activities include geological field mapping and ground-based surveys, while invasive activities involve soil and rock sampling, trenching/pitting, drilling, and test mining. The preferred drilling technique for this exploration programme are Pitting, Reverse Circulation (RC) drilling, In-fill drilling, and **less likely Diamond (Core) drilling**. These methods (techniques) are briefly described below:

- **Pitting:** Pitting is usually employed to test shallow, extensive, flat-lying bodies of mineralization. An ideal example of this would be a buried heavy mineral placer. The main advantage of pitting over a pattern-drill programme on the same deposit is that pits can provide a very large volume sample. Large sample sizes are necessary to overcome problems of variable grade distribution, which are a characteristic feature of such deposits (Marjoribanks, 1997). In areas where the ground is wet, or labour is expensive, pits are best dug with a mechanical excavator. Pits dug to depths of 3–4 m are common and with large equipment excavation to 6 m can be achieved. In wet, soft ground any pit deeper than 1 m is dangerous. Diggers excavate rapidly and pits 3–4 m deep can be dug, logged, sampled, and re-filled within an hour. In cooler and moister weather conditions, thick lateritic soil forms ideal conditions for pitting (Geology Hub, 2021).
- **Reverse circulation (RC) drilling** is achieved by blowing compressed air down the annulus of the drill rod; the differential pressure creates air lift pushing water and cuttings up the inner tube that is inside each rod. The drill cuttings travel up the inside of the drill rod and are collected in a sample bag on the surface. Samples are collected every metre and the number of samples is therefore dictated by the depth of the hole. Generally, a RC drilling program will see multiple holes drilled at 60-90° inclination and can range from 60 to 500m in depth. Compared to diamond core drilling, RC drilling does not require a significant amount of water. For RC drilling, water is often required and used down the hole to cool the drill bit and reduce dust as well as assisting with the transportation of sample bits to the surface.
- **In-fill drilling:** The results of in-fill drilling are intended to support an update to a higher classification of the Mineral Resource estimate. The metallurgical test-work results will improve understanding of blending designs in the exploration schedules for the product offtake specifications (Canyon Resources, 2021).

- **Diamond (Core Drilling):** There are two main types of core drilling: soft and hard coring. This refers to the type of lithology each method is suited for. Soft coring is used when taking a core sample of unconsolidated material and can reach depths of 152.5 m (or more—but this is what is typical for environmental industry projects). Soft coring uses a punch core system. This involves using two containers, one nested inside the other. The inner container is pushed out in front to capture the core sample, then the outer container is extended to provide casing, so the hole does not collapse (Cascade, 2021). This method protects the integrity of the sample from the air or fluid used when progressing the outer container. Hard coring is used when the subsurface consists of materials as hard or harder than sandstone. Much greater depths can be reached with this type of coring; depths up to 1524 m reached. Hard coring also uses two nested containers, but the outer container is extended before the inner container. This means the sample is washed with the drilling fluid or air, but because the core sample is of competent rock, there is no danger in it being disturbed or contaminated. Hard coring is sometimes referred to as diamond coring, as drill bits with small diamonds embedded are used in difficult lithology to cut through rock (Cascade, 2021).

  Only if found to be necessary after RC drilling, that diamond drilling would be applied for ore two-three-four dimensional (2D, 3D and or 4D) modelling and only when the orebody is understood (to some extent).

The selection of the potential mineralization model and exploration targets will be based on the local geology, trenching, drilling and assay results of the samples collected.

Other aspects of the exploration operations include:

2.5.1 Accessibility to Site

The site is accessible from the B4 main road via the district road (D701) from Lüderitz, then through the D733 and D702 that runs through the EPL. The existing road trucks will be utilized by project vehicles and vehicles will be required to stick to limited tracks on site as far as possible to minimize the creation of unnecessary and long-term footprints on the already sensitive desert soils.

2.5.2 Material and Equipment

The material and equipment required for exploration include vehicles: 4x4 trucks, earthmoving equipment, compressor, truck mounted drill rig and diesel-powered generator for drilling and pitting (making pits of 4x4 meters) for gravel sampling. Further materials and equipment will also include field storage container, rock analysis equipment (i.e., X-ray fluorescence (XRF) analyser), drill rigs and drilling support equipment, oils, grease, and drilling fluid (stored in manufacturers approved containers), water in a bowser, and diesel bowser (bunded). Equipment and vehicles will be stored at a designated area near accommodation site, or a storage site established within the EPL area.

2.5.3 Human Resources

The project will employ about ten (10) people, both semi-skilled and skilled, including a site manager, geologist(s), driver, drilling personnel, and sampling workers.

2.5.4 Personnel Accommodation

During prospecting (non-invasive) stage, onsite accommodation will not be required as the personnel will be accommodated and expected to commute from Lüderitz and/or nearby settlements. Similarly, there will not be onsite accommodation for the detailed exploration stage. Therefore, no onsite accommodation will be needed, except in rare cases where pitting or drilling equipment may need to stay on site on some days and a security personnel may need to be deployed to guard it overnight. All vehicles and equipment to be used during both stages (prospecting and detailed exploration) will be stored at a designated area near the working sites.

2.5.5 Services and Infrastructure

Water: For the anticipated drilling method (RC), the water only water required is for cooling down the drill bit, reduce dust and assisting with the transportation of sample bits to the surface. Therefore, the water requirement is not expected to significantly impact the supplies. Regardless, no water will be abstracted from site water resources. The required water will be bought from the nearest supplier such as the Lüderitz Town Council (upon reaching a supply agreement with the Proponent). Water supply for exploration works such as drilling and associated activities will also be sourced from the Lüderitz Town Council and best augmented with carted water from elsewhere outside the project area to ensure that less pressure is put on local supplies.

The required water from the suppliers will be stored on site in trailer-mounted industry standard water reservoirs. About 200 Litres of water per week will be required for domestic use (drinking and ablution).

It is not anticipated that the exploration works will be required. Diamond (Core) drilling is one drilling method that requires a lot of water, approximately 10,000 litres per hole per day (up to a maximum of 25,000 litres/day) per hole (the number of diamond-drilled holes will depend on the results of the exploration programme). However, ground conditions vary and in cases of fractured formations more water may be required. In the case of intersecting open fractures or faulted ground, stabilising agents and packing materials such as bentonite may be used to seal the water loss and minimise water usage.

Power supply: Power required during the operation phase will be provided from diesel-generators.

Fuel (diesel for generators and other equipment): The fuel (diesel) required for exploration equipment will be stored in a tank mounted on a mobile trailer, and drip trays will be readily available on this trailer and monitored to ensure that accidental fuel spills along the tank trailer path/route around the exploration sites are cleaned on time (soon after the spill has happened).

2.5.6 Waste Management

The site will be equipped with secured waste bins for each waste type (i.e., domestic, hazardous, and recyclable). Depending on the amount generated, waste will be sorted and collected weekly or monthly and taken to the nearest landfill site or approved waste dumpsite, such as Lüderitz (upon reaching an agreement with the Lüderitz Town Council).

Sanitation and human waste: The site working sites will be equipped with ablution facilities that will include portable/mobile chemical toilets fitted with sealed septic tanks. The sewage will be handled on site and periodically be taken to the nearest treatment facility either by the Proponent themselves or an independent appointed wastewater removal service provider.

Hazardous waste: Drip trays and spill control kits will be available on site to ensure that oil/fuel spills and leaks from vehicles and equipment are captured on time and contained correctly before polluting the site. The hazardous waste handled and produced on site will be transported for disposal to the nearest appropriate and authorized hazardous waste management facilities.

The waste produced on-site can also be categorized as mineral or non-mineral waste:

Mineral Waste: Consists of solid products of exploration and mineral concentration to acquire the targeted minerals. Mineral waste will potentially be produced throughout the project exploration phase. This waste will be stripped and dumped in allocated areas as stipulated in the EMP.

Non-mineral Waste: Consists primarily of auxiliary materials that will support the exploration phase. This includes but is not limited to items such as empty containers, plastic, and other domestic waste. This waste will be collected, sorted, and taken to the dumpsite regularly, depending on the amount of waste generated.

Health and Safety: Adequate and appropriate Personal Protective Equipment (PPE) will be provided to every project personnel while on and working at site. A minimum of two first aid kits will be readily available on site to attend to potential minor injuries.

Accidental Fire management: A minimum of basic firefighting equipment, i.e., two fire extinguishers will be readily available in vehicles, and at the working sites.

2.5.7 Project Site Security

Temporary storage areas for exploration material, equipment and machines will be set up at working/exploration sites on the EPL. Security will be supplied on a 24-hour basis at the delegated sites for storage if certain equipment will need to be on site overnight on some days.

2.6 Decommissioning and Rehabilitation of Explored Site Areas

Once the exploration activities on the EPL come to an end, the Proponent will need to put site rehabilitation measures in place. Decommissioning and rehabilitation are primarily reinforced through a decommissioning and rehabilitation plan, which consists of safety, health, environmental, and contingency aspects. The economic situation or unconvincing exploration results might force the Proponent to cease the exploration program before predicted closure. Therefore, it is of best practice for the Proponent to ensure the project activities are ceased in an environmentally friendly manner and site is rehabilitated by carrying out the following:

- Dismantling and removal of campsites and associated structures from the project site and area.
- Carrying away of exploration equipment and vehicles.
- Removal of drilling casting, and/ or concrete plinths.
- Clean up of site working areas and transporting the recently generated waste to the nearby approved waste management facility (as per agreement with the facility operator/owner).

Further decommissioning and rehabilitation practice onsite will include:

- Backfilling of exploration and boreholes.
- Levelling of stockpiled topsoil. This will be done to ensure that the disturbed land sites are left close to their pre-exploration state as much as possible.

The rehabilitation and decommissioning referred to herein also entails the dismantling and removal of campsite, and associated structures from the project sites and area.

3 PROJECT ALTERNATIVES

Alternatives are defined as the "*different means of meeting the general purpose and requirements of the activity*" (EMA, 2007). This section will highlight the different ways in which the project can be undertaken and to identify the alternative that will be the most practical, but least damaging to the environment is identified.

Once the alternatives have been established, these are examined by asking the following three questions:

- What alternatives are technically and economically feasible?
- What are the environmental effects associated with the feasible alternatives?
- What is the rationale for selecting the preferred alternative?

The alternatives considered for the proposed development are discussed in the following subsections.

3.1 Types of Alternatives Considered

3.1.1 The "No-go" Alternative

The "no action/no-go" alternative implies that the status quo remains, and nothing happens. Should the proposed works of the prospecting plan on the EPL be discontinued, none of the potential impacts (positive and negative) identified would occur. Furthermore, the Proponent would not be able discover and define the targeted resource for possible mining and contribute to the country's economy through revenue and mining license royalty payments. If the proposed project is to be discontinued, the current land use for the proposed site will remain unchanged.

This option was considered and a comparative assessment of the environmental and socio-economic impacts of the "no action" alternative was undertaken to establish what benefits might be lost if the project is not implemented. The key loses that may never be realized if the proposed project does not go ahead include:

- Loss of foreign direct investment
- No realization of local businesses supports through the procurement of consumable items such as Personal Protective Equipment (PPE), machinery spare parts, lubricants, etc.
- Loss of potential income to local and national government through land & license lease fees and various tax structures.
- Improved geological understanding of the site area regarding the targeted commodities.
- Socio-economic benefits such as skills acquisition to employed local community members would be not realized.

Considering the above listed reasons, the "no-action/go" alternative was not considered the preferred alternative.

3.1.2 Exploration Location

The prospecting/exploration location is dependent on the geological setting (regional and local), the economic geology, and the exploration and mining history of the EPL area. Therefore, finding an alternative location for the planned exploration activities is not possible. This means that the mineralization of the target commodities is area specific, therefore, exploration targets are primarily determined by the geology (host rocks) and the tectonic environment of the site (ore forming mechanism). The tenement has sufficient surface area for future related facilities should an economic mineral deposit be defined.

Given the fact that the EPL nor its future exploration targets cannot be relocated, it will be of utmost importance to reduce the project footprints within the actual active sites of the EPL by ensuring that exploration works and related activities on the EPL are limited to specific sites only.

3.1.3 Exploration Methods

Both invasive and non-invasive exploration activities are expected to take place. The combination of prospecting methods (non-invasive techniques) has no alternatives therefore, these will be implemented as presented. This section rather focuses on the invasive technique (drilling). According to Earth Science Australia (2020), drilling is the culmination of the mineral exploration process where the third dimension of a prospect, the subsurface geometry, is defined. Drilling

provides most of the information for the final evaluation of a prospect and will ultimately determine if the prospect is mineable.

Commonly in mineral exploration drilling, two methods are utilized. These are reverse circulation (RC) drilling and Diamond (Core) drilling, depending on the type of mineral sought after.

Table 1 below presents the different between the two commonly used drilling methods in mineral exploration.

Table 1: Presentation of pitting, and trenching as well as comparison of reverse circulation and diamond drilling methods

Invasive exploration Method (Alternatives Considered)	Short Description	Justification for selected option
Pitting and trenching	-Pits and trenches, or to use the old Cornish mining term, costeans, can be a quick, cheap way of obtaining lithological and structural information in areas of shallow cover. -Pitting is usually employed to test shallow, extensive, flat-lying bodies of mineralization. An ideal example of this would be a buried heavy mineral placer. -The main advantage of pitting over a pattern-drill programme on the same deposit is that pits can provide a very large volume sample. Large sample sizes are necessary to overcome problems of variable grade distribution, which are a characteristic feature of such deposits. -Trenches are usually employed to expose steep dipping bedrock buried below shallow overburden and are normally dug across the strike of the rocks or mineral zone being tested (Marjoribanks, 1997).	- Quick, cheap way of obtaining lithological and structural information in areas of shallow cover. -Pits can provide a very large volume sample. Large sample sizes are necessary to overcome problems of variable grade distribution, which are a characteristic feature of such deposits. -Trenches are an excellent adjunct to RC drilling programmes, where the structural data from trench mapping are needed to complement the lithological information obtained from the drill cuttings (Marjoribanks, 1997).
Reverse Circulation (RC)	-Crushed rock is collected in the form of cuttings samples called back within stems contrast to conventional drilling that puts the air inside the stems and cuttings outside. Here the air passes downwards through the annular space between the inner shaft and the outer tube. -Water is often used down the hole to cool the drill bit and reduce dust as well as assisting with the transportation of sample bits to the surface. -RC drilling is designed for drilling through and crushing hard rock. -RC is fundamentally different from diamond core drilling, both in terms of equipment and sampling. One major difference is that RVC drilling creates small rock chips instead of solid core. Furthermore, according to Technidrill (2020), the RC method: -Allows full recovery of samples continuously -Quick installation	-Compared to diamond drilling, RC requires less water. Therefore, RC drilling will put less pressure on water supply and use. The major differences between RC and diamond drilling are in the rate of penetration and cost per foot. RVC drilling is much faster than diamond core drilling, and much less expensive. -Unlike diamond drilling, this process creates rock chips that can be analysed, rather than a solid, cylindrical piece of rock. -Some types of information, such as structural details, are not possible to obtain in the absence of solid rock. Despite this disadvantage, much valuable information can

Invasive exploration Method (Alternatives Considered)	Short Description	Justification for selected option
	-There is no contact between the walls and cuttings taken at the bottom. -The penetration rate is fast (Techndrill, 2020)	still be obtained from the rock chips. For example, the chips are much easier to examine under a microscope. Testing of fluorescence and effervescence are easily accomplished (Earth Science Australia, 2020). It is for these reasons that RC will be the most preferred method and mainly used. However, the RC drilling would be combined with Diamond drilling where necessary for more reliable data collection and analysis. Diamond drilling would more applicable where deeper holes are required than is possible using RC drilling. -In-fill drilling would also be applied to support an update to a higher classification of the Mineral Resource estimate.
Infill drilling	The progress of an exploration project mostly depends on the result of the primary boreholes. Therefore, primary exploration boreholes must intersect high-grade mineralization zones with considerable thickness. On the other hand, the infill boreholes are designed based on obtained results from the primary boreholes (Fatehi, *et al.,* 2017). Therefore, infill drilling is intended to support an update to a higher classification of the Mineral Resource estimate. The metallurgical test-work results will improve understanding of blending designs in the exploration schedules for the product offtake specifications (Canyon Resources, 2021).	
Diamond (Core) drilling	-Diamond core drilling uses a diamond bit, which rotates at the end of drill rod (or pipe). The opening at the end of the diamond bit allows a solid column of rock to move up into the drill pipe and be recovered at the surface. -The diamond bit is rotated slowly with gentle pressure while being lubricated with water to prevent overheating. As a result, this drilling method is known to use a huge amount of water compared to RC, thus may put pressure on water supply sources. -While the drill cuttings obtained with RC drilling can be analysed to provide a limited amount of information, the scope of these tests	

Invasive exploration Method (Alternatives Considered)	Short Description	Justification for selected option
	is limited, and their locations are less precise. Core samples, on the other hand, will identify actual veins of materials and give you their precise location (BG Drilling, 2016). Therefore, for accuracy's sake, diamond drilling would provide better result. In other words, RC results are reliable but may not be accurate. - As diamond is one of the strongest materials in the world, it has no trouble drilling through most surfaces. Therefore, it works well across a wider range of ground types and conditions. -Time-consuming and more effort is required to obtain the drill core. -Low initial investment, but generally more expensive to meters drilled because of the limitation of the speed.	

The final drilling technique would be determined by the mineralization type. However, based on the information presented in the Table above regarding the detailed exploration methods (drilling), it was found and pre-determined that Reverse Circulation (RC) drilling would be preferrable as much as possible given its efficiency in terms of costs, operating speed and environmentally friendly (water demand) compared to Diamond drilling (which not likely to be used for this proposed exploration).

Although RC drilling is known to have its shortcomings, particularly lack of solid drill recovery and inaccuracy, it is usually combined with Diamond drilling for the exploration of some minerals, if the borehole(s) needs to be deeper than what RC can do.

3.1.4 Services Infrastructure

Alternatives were also considered for the different supporting services and infrastructures envisaged to ensure that the most feasible options were selected. Technological, economic, and environmental limitations were considered in selecting the most feasible option(s). The alternative considered in this regard are presented in **Table 2** below.

Table 2: The presentation of service infrastructure alternatives considered

Category of Infrastructure	Alternatives Considered	Justification for selected option
Ablution facilities	-Install fixed facility with septic tank -Portable facilities with septic tank	-To avoid long-term visual impacts & minimize rehabilitation costs portable facilities were selected as the best option
Shade Structure for working areas	-Shade structure made from blue/ red corrugated sheets -Shade structure made with shade net	-Shade structure made from corrugated sheets deemed most suitable due to robustness, & resistance to wind destruction especially in the open desert area
Water supply	-Prioritizing carting/trucking water from outside the project area (elsewhere) -Abstracting from local aquifers (boreholes)	-Due to the low potential and risk of further impacting the local aquifers, carting water to site from elsewhere would be the ideal and in the best interest of both the local water users and the water environment.
Diesel storage	-Install fixed above-ground diesel tank on site -Trailer mounted diesel tank	-During exploration use trailer mounted diesel tank for fuel storage due to great mobility requirements during exploration. A fixed tank would not be ideal nor in the best of the environment due to the short duration of project activities (months)
Power supply	-Diesel generator set -Install photovoltaic panels	-Most practical & economically viable for exploration
		-Option likely to be considered for long-term operations if economic deposit with high life of mine is found
Offices, accommodation	-Erect dis-mantable prefabricated units, rented accommodation facilities or tented accommodation structures on site	Favoured during field exploration phase due to: (a) Ease of installation, (b) Low installation costs and (c) Ease of dismantling & moving
	Erect Permanent buildings	Unlikely/not permitted in this park
	No prefabricated-structured offices or accommodation structures.	Not favoured. The campsite and office structures would not be permitted in a protected area (visual impact from structures).

4 LEGAL FRAMEWORK: LEGISLATION, POLICIES AND GUIDELINES

A review of applicable and relevant Namibian legislation, policies and guidelines to the proposed development are given in this section. This review serves to inform the project Proponent, Interested and Affected Parties and the decision makers at the DEAF of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled to establish the proposed prospecting and exploration activities.

4.1 The Environmental Management Act (No. 7 of 2007)

This EIA was carried out according to the Environmental Management Act (EMA) and its Environmental Impact Assessment (EIA) Regulations (GG No. 4878 GN No. 30).

The EMA has stipulated requirements to complete the required documentation to obtain an Environmental Clearance Certificate (ECC) for permission to undertake certain listed activities. These activities are listed under the following Regulations:

- 3.1 The construction of facilities for any process or activities which requires a license, right of other forms of authorization, and the renewal of a license, right or other form of authorization, in terms of the Minerals (Prospecting and Mining Act, 1992).
- 3.2 other forms of mining or extraction of any natural resources whether regulated by law or not.
- 3.3 Resource extraction, manipulation, conservation, and related activities.

Other legal obligations that are relevant to the proposed activities of EPL 7874 and related activities are presented in **Table 3**.

Table 3: Applicable local, national and international standards, policies and guidelines governing the proposed development

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
The Constitution of the Republic of Namibia, 1990 as amended	The Constitution of the Republic of Namibia (1990 as amended) addresses matters relating to environmental protection and sustainable development. Article 91(c) defines the functions of the Ombudsman to include: "…the duty to investigate complaints concerning the over-utilisation of living natural resources, the irrational exploitation of non-renewable resources, the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia…" Article 95(l) commits the state to actively promoting and maintaining the welfare of the people by adopting policies aimed at the: "…Natural resources situated in the soil and on the subsoil, the internal waters, in the sea, in the continental shelf, and in the exclusive economic zone are property of the State."	By implementing the environmental management plan, the establishment will be in conformant to the constitution in terms of environmental management and sustainability. Ecological sustainability will be main priority for the proposed development.
Environmental Management Act No. 7 of 2007 and its 2012 EIA Regulations Government Notice 28-30 (Government Gazette 4878	Part 2 of the Act sets out 12 principles of environmental management, summarized as follows: Community involvement in natural resources management, must be promoted and facilitated. The participation of all I&APs must be promoted and decisions must consider the interest, needs and values of I&APs.	The Proponent has the responsibility to ensure that the proposed activities, as well as the EA and detailed process, conforms to the principles of this Act. In developing the EA, EDS has been cognizant of these requirements, and accordingly the EA process has been undertaken in conformance with this Act and the EIA Regulations (2012).

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
	Equitable access to environmental resources must be promoted and the functional integrity of ecological systems must be considered to ensure sustainable systems. Assessments must be undertaken for activities which may have significant effects on the environment or the use of natural resources. Sustainable development must be promoted in all aspects relating to the environment. Namibia's cultural and natural heritage including, its biological diversity, must be protected and respected. The option that provides the most benefit or causes the least damage to the environment, at a cost acceptable to society must be adopted to reduce the generation of waste and polluting substances at source. The reduction, re-use and recycling of waste must be promoted. A person who causes damage to the environment must pay the costs associated with rehabilitation of damage to the environment and to human health caused by the pollution. Damage to the environment must be prevented and activities which cause such damage must be reduced, limited, or controlled.	

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Nature Conservation Amendment Act, No. 3 of 2017	National Parks are established and gazetted in accordance with the Nature Conservation Ordinance, 1975 (4 of 1975), as amended. The Ordinance provides a legal framework with regards to the permission of entering a state protected area, as well as requirements for individuals damaging objects (geological, ethnological, archaeological, and historical) within a protected area. Though the Ordinance does not specifically refer to mining as an activity within a protected area (PA) or recreational area (RA), it does restrict access to PA's and prohibits certain acts therein as well as the purposes for which permission to enter game parks and nature reserves may be granted.	The Proponent will be required to enhance the conservation of biodiversity and the maintenance of the ecological integrity of protected areas and other State land. The relevant permits to undertake specific activities within the Park should be applied for and obtained from MEFT's Park Division
The Parks and Wildlife Management Bill of 2008	Aims to provide a regulatory framework for the protection, conservation, and rehabilitation of species and ecosystems, the sustainable use and sustainable management of indigenous biological resources, and the management of protected areas, to conserve biodiversity and to contribute to national development.	
Minerals (Prospecting and Mining) Act (No. 33 of 1992)	Section 52 requires mineral license holders to enter into a written agreement with affected landowners before exercising rights conferred upon the license holder.	The Proponent should enter into a written agreement with landowners or authority before carrying out exploration on the land. The Proponent should carry out an assessment of the impact on the receiving environment.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
	Section 52(1) mineral licence holder may not exercise his/her rights in any town or village, on or in a proclaimed road, land utilised for cultivation, within 100m of any water resource (borehole, dam, spring, drinking trough etc.) and boreholes, or no operations in municipal areas, etc.), which should individually be checked to ensure compliance. Section 54 requires written notice to be submitted to the Mining Commissioner if the holder of a mineral license intends to abandon the mineral license area. Section 68 stipulates that an application for an exclusive prospecting license (EPL) shall contain the particulars of the condition of, and any existing damage to, the environment in the area to which the application relates and an estimate of the effect which the proposed prospecting operations may have on the environment and the proposed steps to be taken to prevent or minimize any such effect. Section 91 requires that rehabilitation measures should be included in an application for a mineral license.	The Proponent should include as part of their application for the EPL, measures by which they will rehabilitate the areas where they intend to carry out mineral exploration activities. The Proponent may not carry out exploration activities within the areas limited by Section 52 (1) of this Act.
Mine Health & Safety Regulations, 10th Draft	Makes provision for the health and safety of persons employed or otherwise present in mineral licenses area. These deal with among other matters; clothing and devices; design, use, operation, supervision, and control of machinery; fencing and guards; and safety measures during repairs and maintenance.	The Proponent should comply with all these regulations with respect to their employees.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)	Regulation 3(2)(b) states that "No person shall possess [sic] or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area"	The Proponent should obtain the necessary authorisation from the MME for the storage of fuel on-site.
The Regional Councils Act (No. 22 of 1992)	This Act sets out the conditions under which Regional Councils must be elected and administer each delineated region. From a land use and project planning point of view, their duties include, as described in section 28 "to undertake the planning of the development of the region for which it has been established with a view to physical, social and economic characteristics, urbanisation patterns, natural resources, economic development potential, infrastructure, land utilisation pattern and sensitivity of the natural environment.	The relevant Regional Council are I&APs and must be consulted during the Environmental Assessment (EA) process. The project site falls under the //Karas Regional Council; therefore, they should be consulted.
Local Authorities Act No. 23 of 1992	To provide for the determination, for purposes of local government, of local authority councils; the establishment of such local authority councils; and to define the powers, duties, and functions of local authority councils; and to provide for incidental matters.	The Lüderitz Town Council is the nearest local authority that may be needed for services provision such as water supply and waste disposal, therefore they should be consulted.
Water Act 54 of 1956	The Water Resources Management Act 11 of 2013 is presently without regulations; therefore, the Water Act No 54 of 1956 is still in force: Prohibits the pollution of water and implements the principle that a person disposing of effluent or waste has a duly of care to prevent pollution (S3 (k)).	The protection (both quality and quantity/abstraction) of water resources should be a priority.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
	Provides for control and protection of groundwater (S66 (1), (d (ii)). Liability of clean-up costs after closure/abandonment of an activity (S3 (l)). (l)).	
Water Resources Management Act (No 11 of 2013)	The Act provides for the management, protection, development, use and conservation of water resources; and provides for the regulation and monitoring of water services and to provide for incidental matters. The objects of this Act are to: Ensure that the water resources of Namibia are managed, developed, used, conserved, and protected in a manner consistent with, or conducive to, the fundamental principles set out in Section 66 - protection of aquifers, Subsection 1 (d) (iii) provide for preventing the contamination of the aquifer and water pollution control (Section 68).	
National Heritage Act No. 27 of 2004	To provide for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.	The Proponent should ensure compliance with these Acts requirements. The necessary management measures and related permitting requirements must be taken. This done by the consulting with the National Heritage Council of Namibia.
The National Monuments Act (No. 28 of 1969)	The Act enables the proclamation of national monuments and protects archaeological sites.	

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Marine Resources Act No. 27 of 2000	The Act provides for the conservation of the marine ecosystem and the responsible utilization, conservation, protection and promotion of marine resources on a sustainable basis; for that purpose, to provide for the exercise of control over marine resources; and to provide for matters connected therewith.	The proposed area is near the Namibian Islands Marine Protected Area (NIMPA) Ecologically or Biologically Significant Marine Area (EBSA) that is in the central region of the BCLME within Lüderitz Upwelling Cell. Therefore, the project activities should ensure that they do not compromise the marine protected areas within the EPL.
Tsau //Khaeb National Park Management Plan of 2013 to 2018	The Management Plan sets out the vision, objectives and guidelines for the management and development of the Tsau //Khaeb National Park that all involved with the Park including MEFT decision-makers and management staff, personnel of other Ministries and Parastatals, private sector companies and individuals, all contractors, partners, tourists and any entity and individual dealing in any way with the Park, must ensure that that any actions and decisions relating to the Park are in strict accordance with this Management Plan.	The specific objectives of the Management Plan with regards to Prospecting and mining are to: (a) integrate high value nationally strategic prospecting mining activities into the land use and management of the Park in ways that minimize environmental and socio-economic impacts and that optimize biodiversity, ecosystem and landscape conservation.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
	The Management Plan's chapter 5 on ''Prospecting and Mining states that '*All prospecting and mining activities are planned, managed and decommissioned using best available practice, taking into consideration long-term national benefits vis-à-vis benefits from current and potential land uses and applying precautionary and polluter pays principles and due caution to minimize negative environmental impact*.''	(b) to restore areas damaged by past prospecting and mining to as near a natural state as can reasonably be expected, or as may be decided for agreed future land use (e.g. retaining roads, retain selected mining infrastructure for tourism information purposes) and disallow any low value mining (e.g. dimension stone).
Soil Conservation Act (No 76 of 1969)	The Act makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources, through directives declared by the Minister.	Duty of care must be applied to soil conservation and management measures must be included in the EMP.
Forestry Act (Act No. 12 of 2001	The Act provides for the management and use of forests and forest products. Section 22. (1) provides: "Unless otherwise authorised by this Act, or by a licence issued under subsection (3), no person shall on any land which is not part of a surveyed erven of a local authority area as defined in section 1 of the Local Authorities Act, 1992 (Act No. 23 of 1992) cut, destroy or remove - (a) vegetation which is on a sand dune or drifting sand or on a gully unless the cutting, destruction or removal is done for the purpose of stabilising the sand or gully; or (b) any living tree, bush or shrub growing within 100 m of a river, stream or watercourse."	The proponent will apply for the relevant permit under this Act if it becomes necessary.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Public Health Act (No. 36 of 1919)	Section 119 states that "no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."	The Proponent and all its employees should ensure compliance with the provisions of these legal instruments.
Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding health and safety of labourers.	
Atmospheric Pollution Prevention Ordinance (1976)	This ordinance provides for the prevention of air pollution and is affected by the Health Act 21 of 1988. Under this ordinance, the entire area of Namibia, apart from East Caprivi, is proclaimed as a controlled area for the purposes of section 4(1) (a) of the ordinance.	The proposed project and related activities should be undertaken in such a way that they do not pollute or compromise the surrounding air quality. Mitigation measures should be put in place and implemented on site.
Hazardous Substance Ordinance, No. 14 of 1974	The ordinance provides for the control of toxic substances. It covers manufacture, sale, use, disposal and dumping as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage, and handling.	The Proponent should handle and manage the storage and use of hazardous substances on site so that they do not harm or compromise the site environment

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Road Traffic and Transport Act, No. 22 of 1999	The Act provides for the establishment of the Transportation Commission of Namibia; for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, the control and regulation of road transport across Namibia's borders; and for matters incidental thereto. Should the Proponent wish to undertake activities involving road transportation or access onto existing roads, the relevant permits will be required.	Mitigation measures should be provided for, if the roads and traffic impact cannot be avoided, the relevant permits must be applied for.
Labour Act (No. 6 of 1992)	Ministry of Labour (MOL) is aimed at ensuring harmonious labour relations through promoting social justice, occupational health and safety and enhanced labour market services for the benefit of all Namibians. This ministry insures effective implementation of the Labour Act no. 6 of 1992.	The Proponent should ensure that the prospecting and exploration activities do not compromise the safety and welfare of workers.

4.2 International Policies, Principles, Standards, Treaties and Conventions

The international policies, principles, standards, treaties, and conventions applicable to the project are as listed in **Table 4** below.

Table 4: International Policies, Principles, Standards, Treaties and Convention applicable to the project

STATUTE	PROVISIONS	PROJECT IMPLICATIONS
Equator Principles	A financial industry benchmark for determining, assessing, and managing environmental and social risk in projects (August 2013). The Equator Principles have been developed in conjunction with the International Finance Corporation (IFC), to	These principles are an attempt to: '…encourage the development of socially responsible projects, which subscribe to appropriately responsible environmental

STATUTE	PROVISIONS	PROJECT IMPLICATIONS
	establish an International Standard with which companies must comply with to apply for approved funding by Equator Principles Financial Institutions (EPFIs). The principles apply to all new project financings globally across all sectors. **Principle 1:** Review and Categorization **Principle 2**: Environmental and Social Assessment **Principle 3:** Applicable Environmental and Social Standards **Principle 4:** Environmental and Social Management System and Equator Principles Action Plan **Principle 5:** Stakeholder Engagement **Principle 6:** Grievance Mechanism **Principle 7:** Independent Review **Principle 8:** Covenants **Principle 9:** Independent Monitoring and Reporting **Principle 10:** Reporting and Transparency	management practices with a minimum negative impact on project-affected ecosystems and community-based upliftment and empowering interactions.'
The International Finance Corporation (IFC) Performance Standards	The International Finance Corporation's (IFC) Sustainability Framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Policy on Environmental and Social Sustainability describes IFC's commitments,	The Performance Standards are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of

STATUTE	PROVISIONS	PROJECT IMPLICATIONS
	roles, and responsibilities related to environmental and social sustainability. As of 28 October 2018, there are ten (10) Performance Standards (Performance Standards on Environmental and Social Sustainability) that the IFC requires a project Proponents to meet throughout the life of an investment. These standard requirements are briefly described below. **Performance Standard 1**: Assessment and Management of Environmental and Social Risks and Impacts **Performance Standard 2**: Labour and Working Conditions **Performance Standard 3:** Resource Efficient and Pollution Prevention and Management **Performance Standard 4:** Community Health and Safety **Performance Standard 5:** Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement **Performance Standard 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources **Performance Standard 7**: Indigenous Peoples/Sub-Saharan African Historically Undeserved Traditional Local Communities **Performance Standard 8:** Cultural Heritage **Performance Standard 9:** Financial Intermediaries (FIs)	the Client (Borrower) in relation to project-level activities. In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation to achieve its overall development objectives.

STATUTE	PROVISIONS	PROJECT IMPLICATIONS
	Performance Standard 10: Stakeholder Engagement and Information A full description of the IFC Standards can be obtained from http://www.worldbank.org/en/projects-operations/environmental-and-social-framework/brief/environmental-and-social-standards?cq_ck=1522164538151#ess1	
The United Nations Convention to Combat Desertification (UNCCD) 1992	Addresses land degradation in arid regions with the purpose to contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change. The convention objective is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability United Nation Convention	The project activities should not be such that they contribute to desertification.
Convention on Biological Diversity 1992	Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use. Promote the protection of ecosystems, natural habitats, and the maintenance of viable populations of species in natural surroundings	Removal of vegetation cover and destruction of natural habitats should be avoided and where not possible minimised

STATUTE	PROVISIONS	PROJECT IMPLICATIONS
Stockholm Declaration on the Human Environment, Stockholm (1972)	It recognizes the need for: "a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.	Protection of natural resources and prevention of any form of pollution.

Relevant international Treaties and Protocols ratified by the Namibian Government

- Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES), 1973.
- Convention on Biological Diversity, 1992.
- World Heritage Convention, 1972.

5 ENVIRONMENTAL BASELINE (BIOPHYSICAL AND SOCIAL)

The proposed exploration programme will be undertaken in specific environmental and social conditions. Understanding the pre-project conditions of the environment will aid in providing background "information" of what was before and what would be after project. This also helps the EAP in identifying the sensitive environmental features that may need to be protected through the recommendations and effective implementation of mitigation measures provided. The summary of selected biophysical and social baseline information pertaining to the prospecting area is given below.

The baseline information presented below is sourced from a variety of sources including reports of studies conducted in the //Karas Region, as well as those done in the Lüderitz area. Further information was obtained by the Consultant during site visit and two independent specialists' inputs (Ecology and Archaeology Studies).

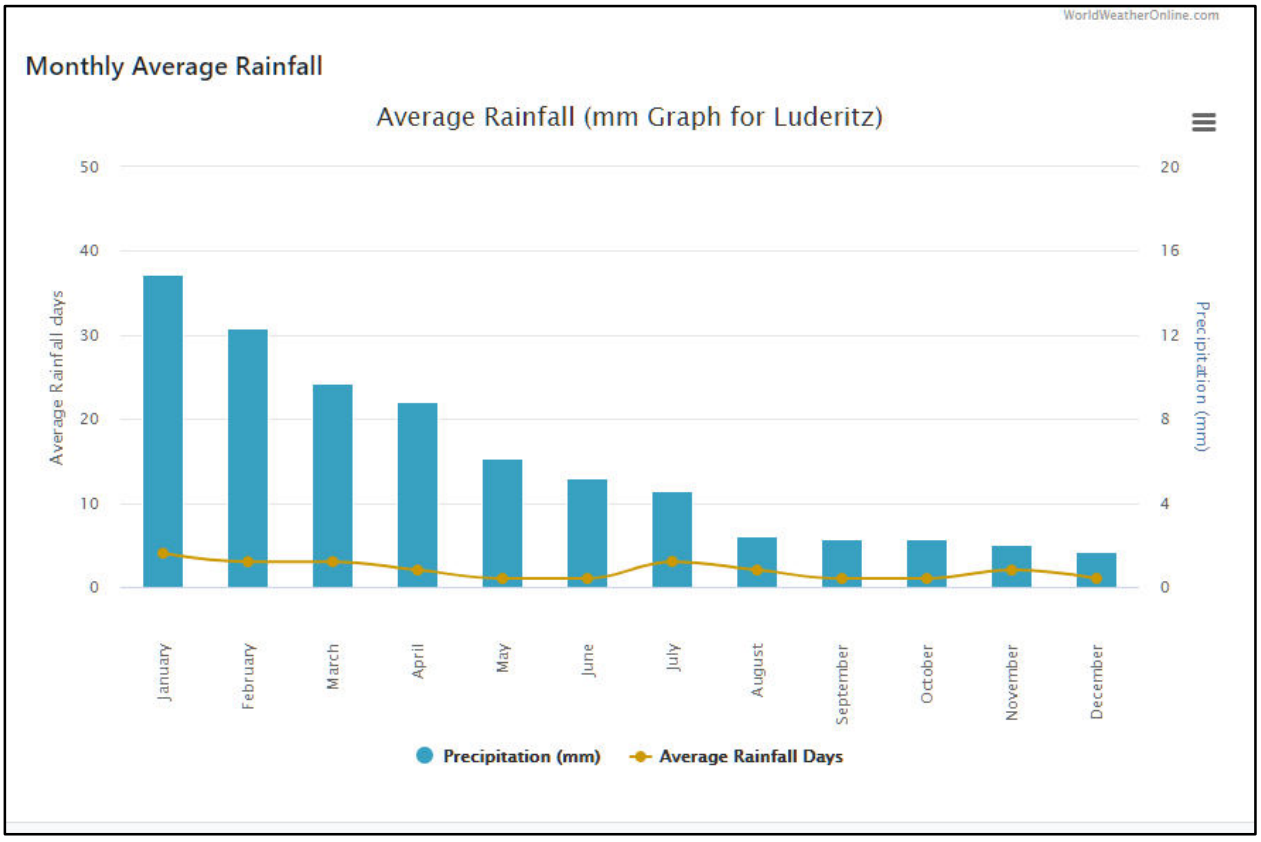
5.1 Climate

Climate has a major influence on the exploration activity on the EPL. Climatic conditions determine the appropriate and/or inappropriate times to conduct exploration activity. Generally,

the climate at Lüderitz is classified as very arid (desert). The arid conditions are because of dry descending air and upwelling of the cold Benguela Current. As clouds are a regular occurrence in Lüderitz. This is due to the influence of the Benguela Current and forms a major source of water for flora in the Namib Desert (Geo-Pollution Technologies, 2020). Climate data was obtained from the Southern African Science Service Centre for Climatic Change and Adaptive Land Management (SASSCAL) weather station (Khoichab Pan), the nearest weather station to the project site (EPL 7874).

5.1.1 Rainfall

Rainfall in the region is mostly unpredictable and rainfall events are equally unlikely in all 12 months throughout the year. Rainfall is typically limited with, on average, less than 50 mm per annum. The graph below (**Figure 5**) shows the average monthly rainfall around the EPL area between November 2019 and November 2020. The area is dry for most of the year. In April, the highest rainfall was recorded at 12mm, and about 6mm recorded in July. There are both relatively low levels of rainfall.



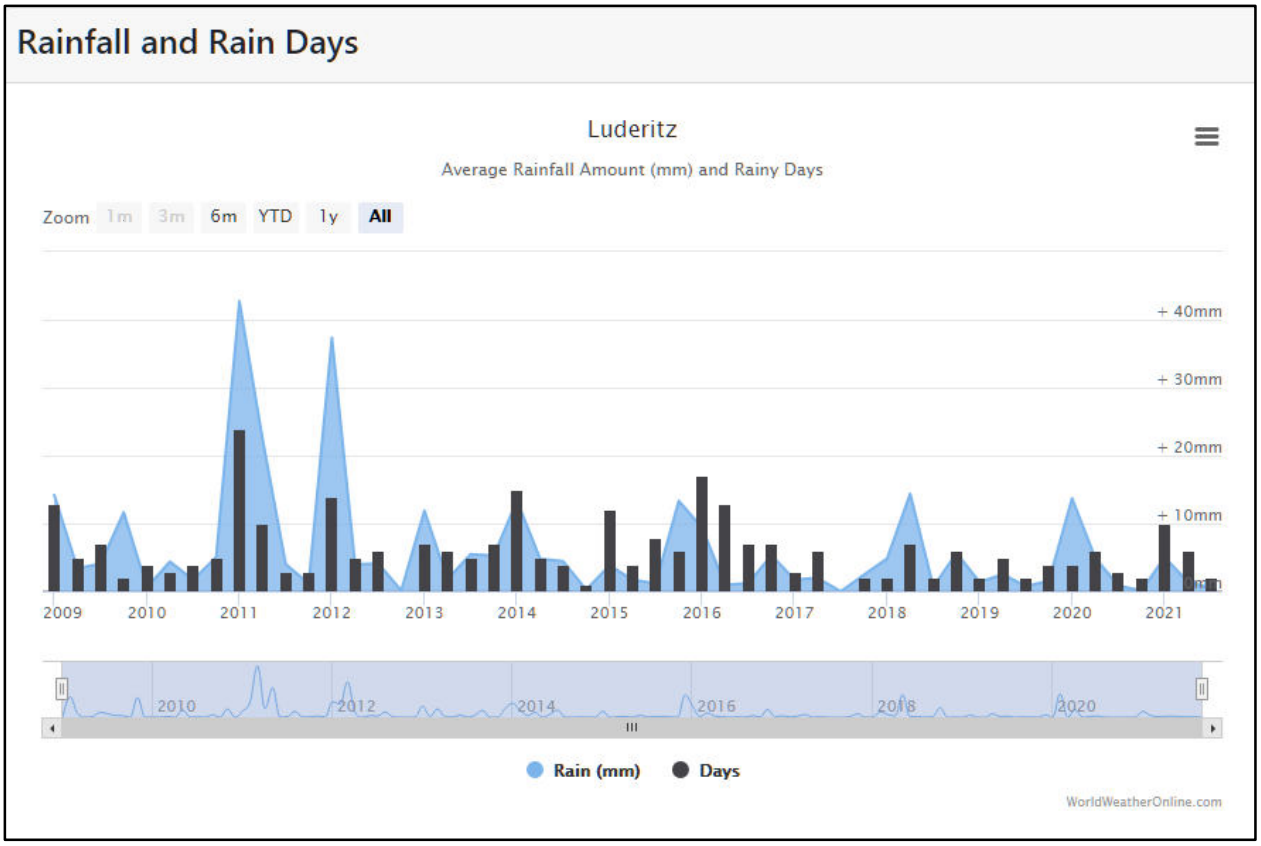


Figure 5: **The monthly average rainfall, rainfall and rain days for Lüderitz area (Source: World Weather Online, 2021).**

5.1.2 Temperature

The highest temperatures within the //Karas region are between February and March at 27 °C and 26 °C, respectfully. The lower temperatures are in the months of June to August between 16 °C and 19 °C within the vicinity of the EPL and are mostly influenced by the cold breeze of sea. **Figure 6** below shows that the area experiences average temperatures above 15°C for most of the year.

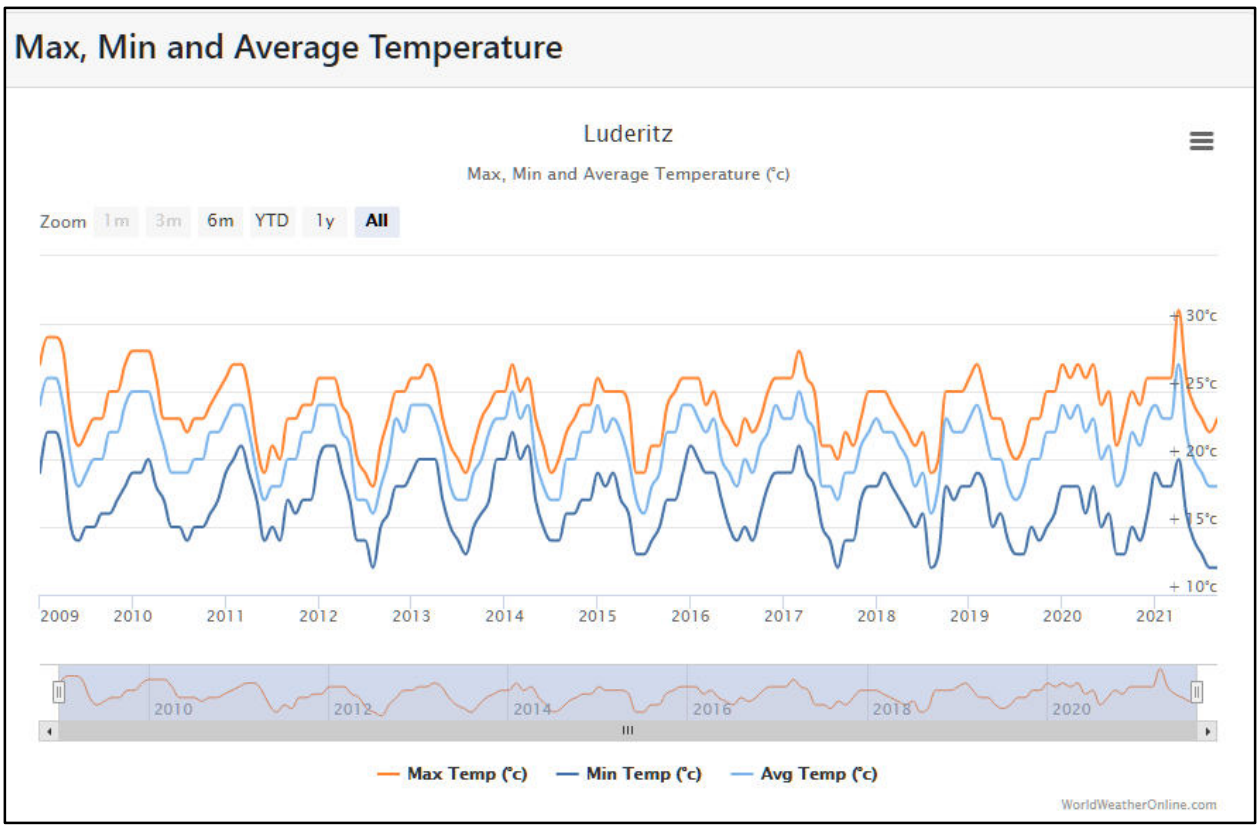


Figure 6: Maximum, minimum and average temperature patterns for the Lüderitz Area (Source: World Weather Online, 2021)

5.1.3 Winds

Winds in the EPL area are often very strong and occur throughout the year. Winds from the south predominate at Lüderitz (Mendelsohn et al., 2009), which is the vicinity of the EPL location. The Benguela Current and the associated cold water upwelling system enhanced by prevalent southeast winds supplies moisture to the area in the form of fog. During the summer months, average wind speeds of between 1.5 and 2.5 40 m/s can be experienced at Lüderitz, causing frequent sandstorms. The highest monthly average wind speed experienced around the project area in 2020 was in January at a speed of 2.6 m/s and the lowest monthly average wind speed was experienced in April at a speed of 0.5 m/s. The graph in **Figure 7** below shows the average monthly wind speed recorded between November 2019 and November 2020.

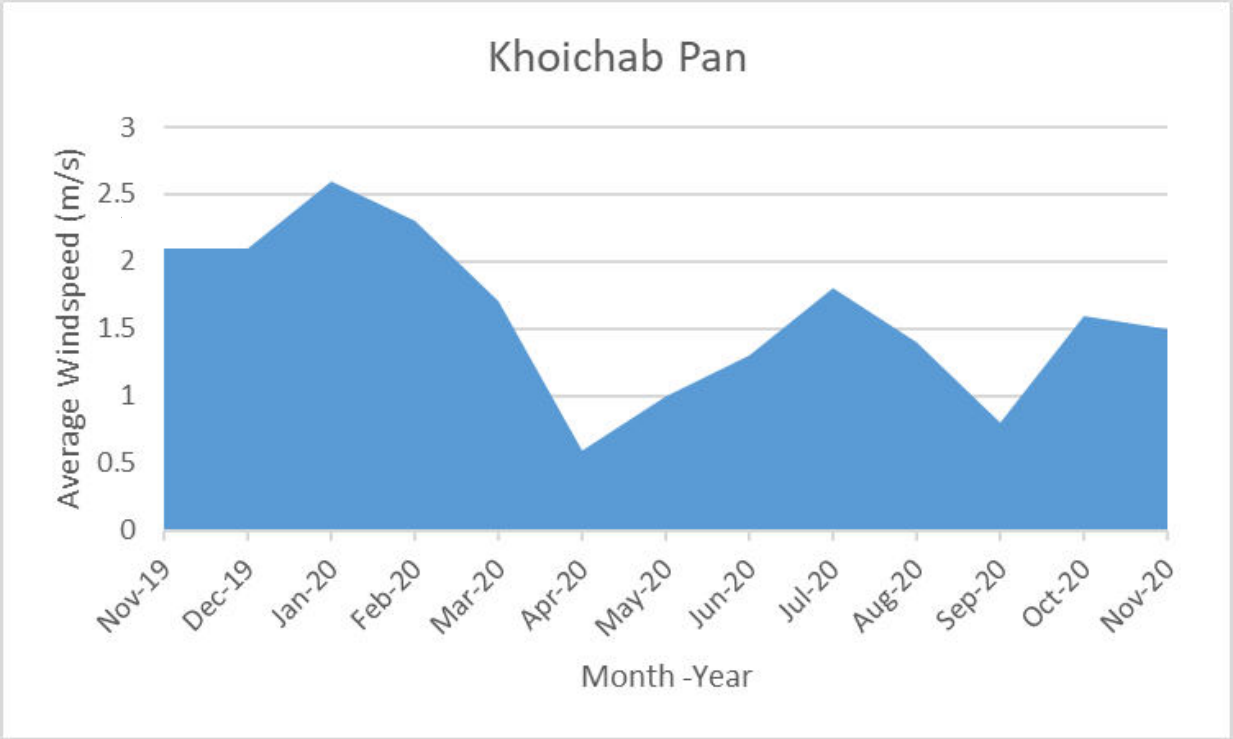


Figure 7: A graph showing average wind speed (2019 – 2020), Khoichab Pan.

5.1.4 Humidity

Fog is a major source of moisture for ecosystems within the desert/semi-deserts. Namibia has low levels of humidity in general, and the lack of moisture in the air has a major impact on its climate by reducing cloud cover and rain, and increasing the rates of evaporation (Mendelsohn, 2002). Relative humidity in the Lüderitz area ranges generally from 20 - 40% during the most humid months (February and April) and between 25 and 28% during the least humid months (May, June, and July). **Figure 8** below shows the monthly average relative humidity recorded during the months between November 2019 and November 2020 at the Khoichab pan.

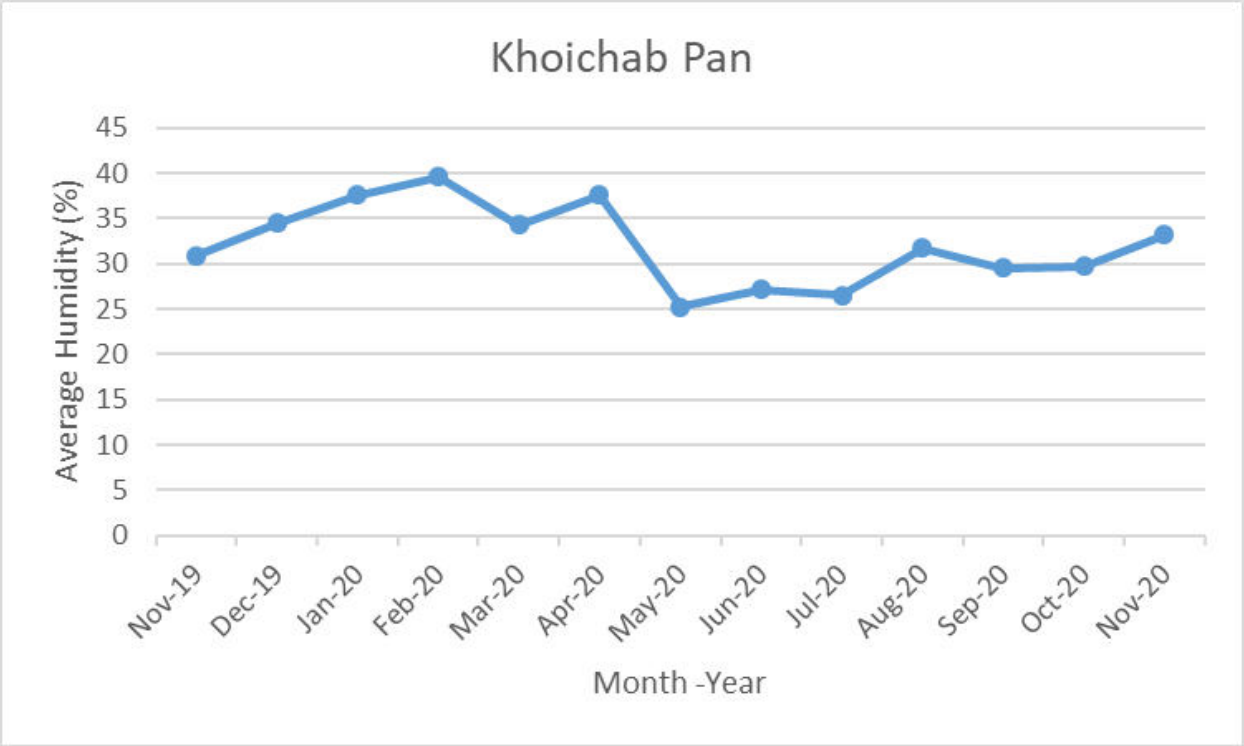


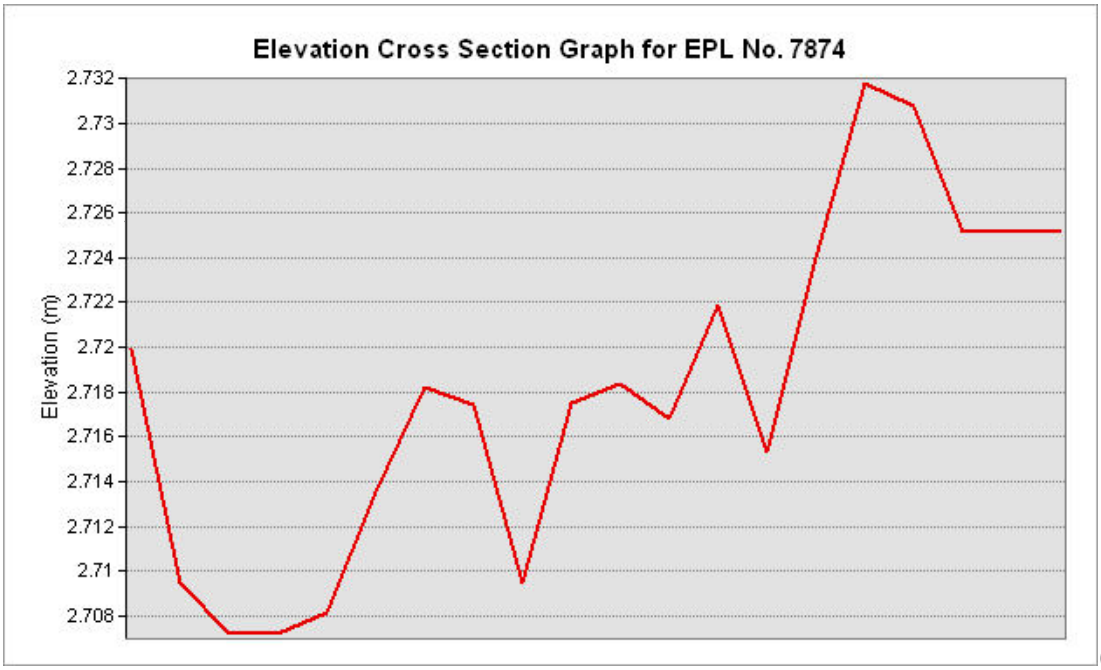
Figure 8: **A graph showing average humidity patterns for one year (2019-2020), Khoichab Pan.**

5.2 Topography

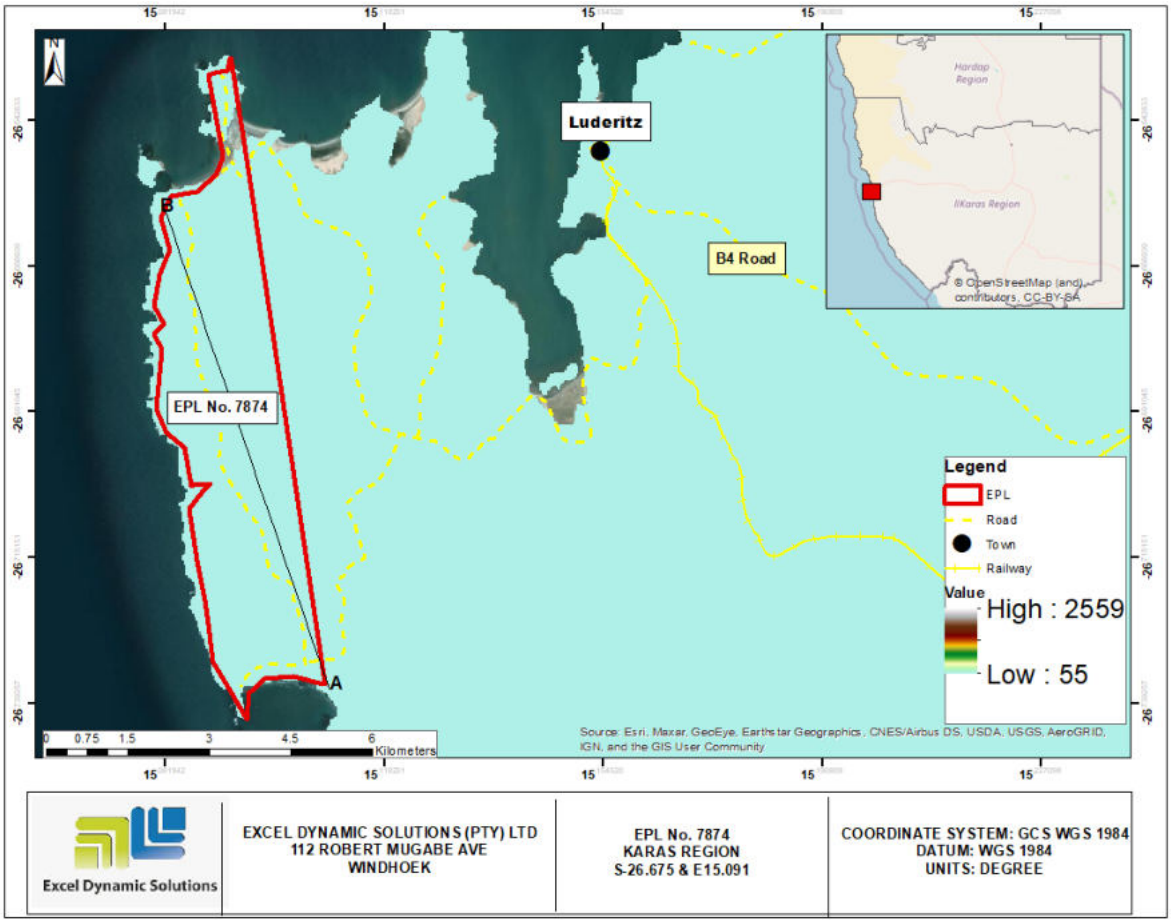
The EPL area is dominated by the Namib Plains which is characterized with sand drifts and prominent inselbergs largely of the mid- palaeozoic age, and geomorphology dominated by the EPL is the broken terrain with thin soils.

The landscape around Lüderitz consists of various rocky outcrops with islands and peninsulas encompassed by the Atlantic Ocean.

Figures 9a and **9b** below show the elevation profile (elevation cross section and elevation map, respectively) of the site (EPL 7874). As seen in **Figure 9b**, EPL No. 7874 lies in an elevation range of 2, 700 m and 2, 732 m.



(a)



(b)

Figure 9: Elevation profile within the EPL 7874.

5.3 Geology

The EPL is less than 8 km west from the town of Lüderitz and is on the Lüderitz Peninsula, between Grosse Bucht and Diaz Point which lies entirely within the Namib Desert. The south of the Khoichab River is dominated by dunes and crystalline rock outcrops of the Mid-Proterozoic Era. This includes geology from the Namibian- and Mokolian Age. The Mokolian Age rocks is the oldest to be found in Namibia, dating back to 2,200 Ma. The Atlantic seaboard is characterized largely by a rocky coastline. Outcrops of the Neoproterozoic Gariep Supergroup predominate in the south of the map area, along the coast and east of Elizabeth Bay.

The oldest rocks in which the EPL lies, is part of the Namaqua Belt which is approximately 400 km wide. The Namaqua Belt hosts the Namaqua Metamorphic Complex, which extends across southern Namibia. The EPL area lies within the Sperrgebiet Terrane of the low-grade Richtersveld Sub-province which exhibits partially migmatitic paragneiss with bands and lenses of amphibolite and metasedimentary rocks, and pods of orthogneisses predominate in the Lüderitz area (Greenman, 1966). The area consists of undifferentiated metamorphic and intrusive rock types of Mokolian age.

The south of the EPL lays on the Gariep Belt, which forms an important part of the larger network of Pan-African/Brasiliano orogenic belts in SW Gondwana. The belt is distinguished from the adjoining late Neoproterozoic to Cambrian orogenic belts by a lack of a high-grade metamorphic core complex, the absence of high-pressure metamorphism and the absence of synorogenic, collision-related magmatism. Due to their generally low metamorphic grade, the rocks exposed in the Gariep Belt provide an excellent record of Neoproterozoic earth history from continental break-up, and opening of an oceanic basin, to continental collision leading up to the amalgamation of Gondwana. The area consists of dolomite, shale, schist, green schist, ortho-/para-amphibolite, quartzite, intraformation and basal mixture and grit rock types of Namibian age.

In addition to the marine placer deposits, aeolian placers or deflation deposits occur in, up to 15 km wide deflation belt between Chameis Bay and Lüderitz. Within this belt, salt-assisted weathering and aeolian abrasion have eroded elongated endoreic depressions up to 120 m deep into schists and dolomites of the Gariep Supergroup and granitic gneisses of the Namaqua Complex.

Figure 10 below is a map of the geology of the project site (EPL 7874) and **Figure 11** are some of the typical rock units (outcrops) observed on some areas of the EPL during site visit.

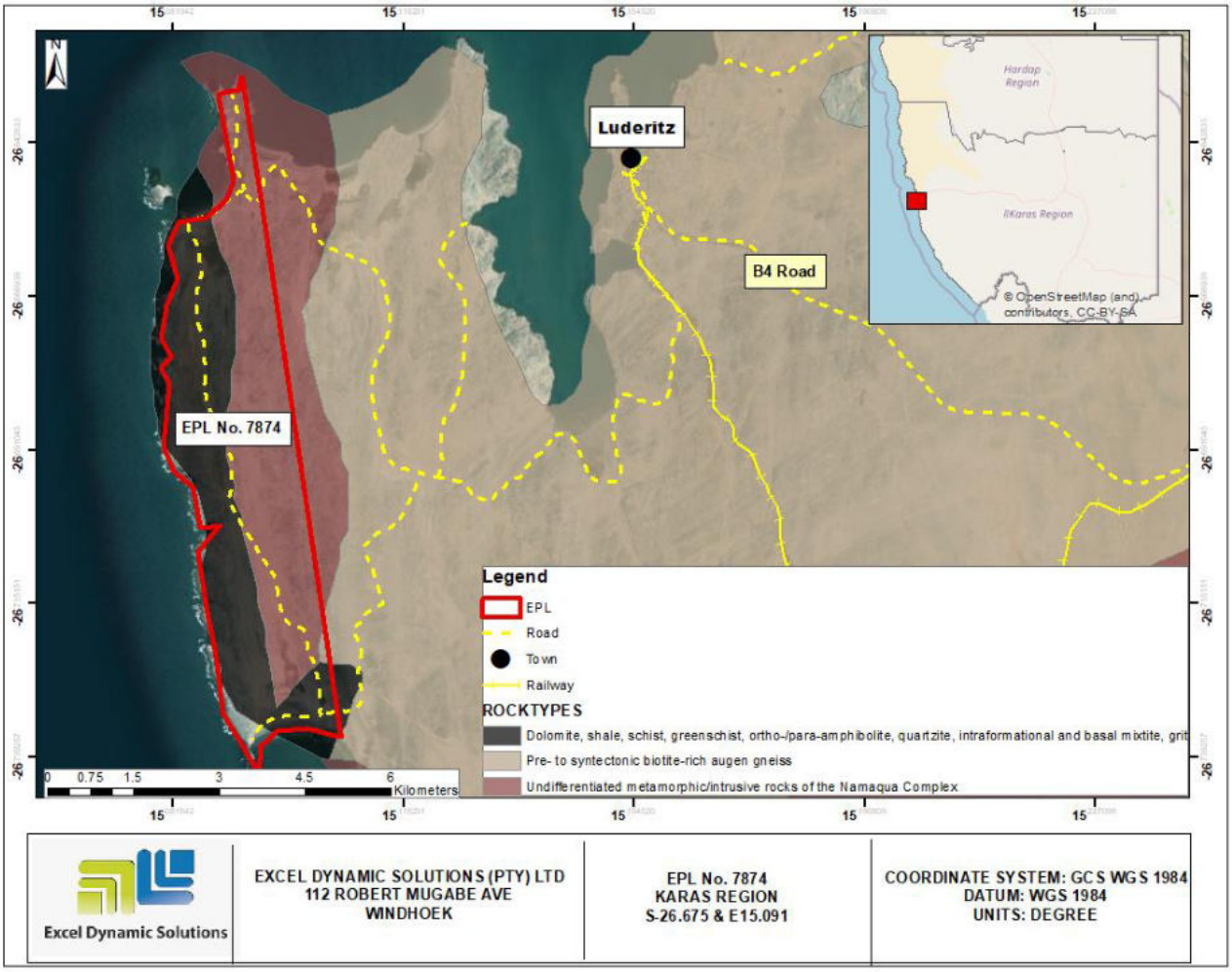


Figure 10: Map indicating the Geology of EPL 7874.

Figure 11: Some shale, and schist rock outcrops on EPL

5.4 Soils

The Sperrgebiet (now the Tsau //Khaeb National Park) environment is fragile and characterised with aridity and the soils in the area are susceptible to erosion and compaction.

The study area is mostly sand valley and slightly undulating land surface. The soils in this area are weakly developed and shallow. Vegetation cover is generally sparse because the soil will not be able to provide plants with sufficient water or nutrients. Typical soil colours vary from light grey, light brown and brown.

A map of dominant soil is shown on **Figure 12** and **Figure 13** are some photos of different soil types found within the EPL.

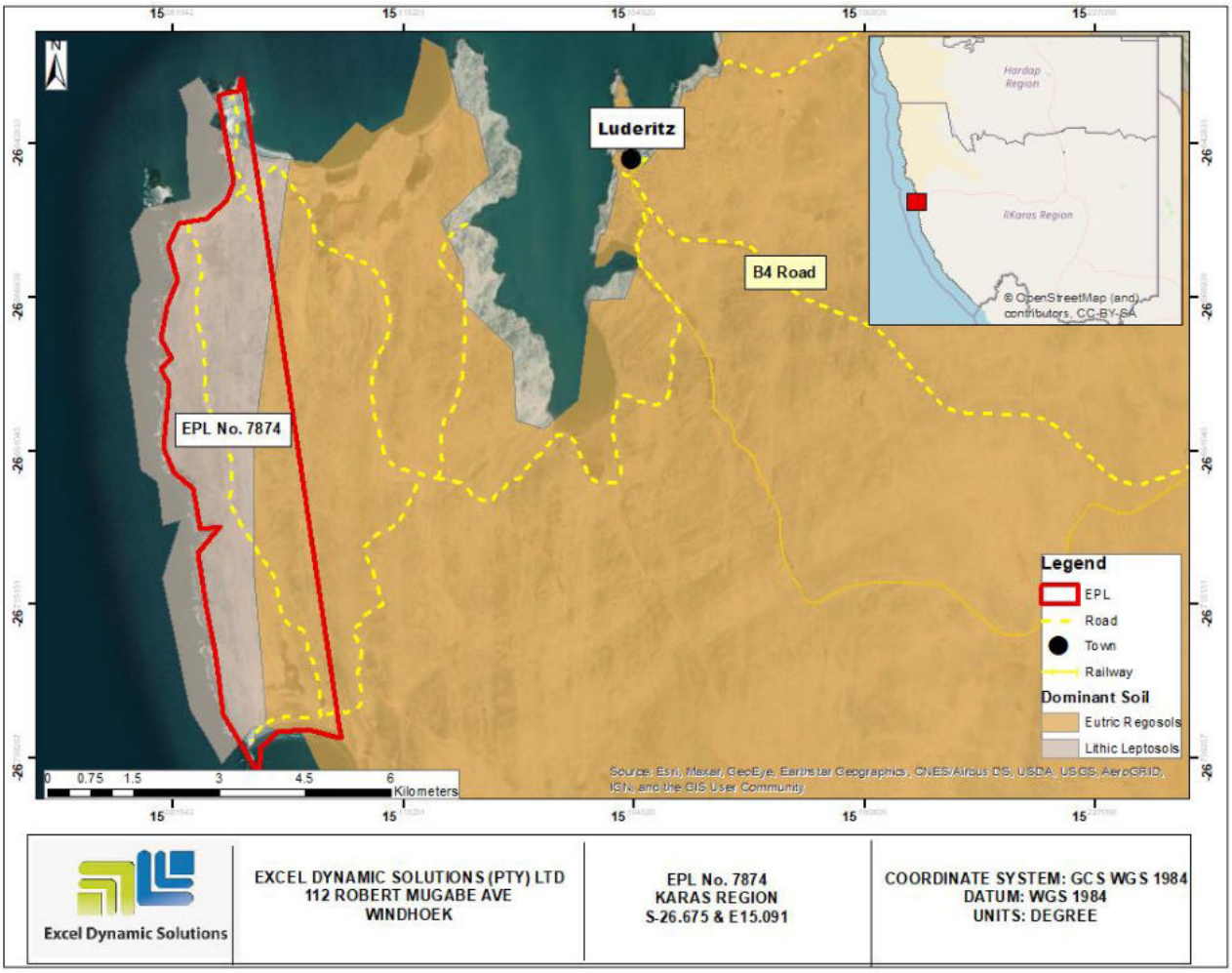


Figure 12: Map of dominant soils at EPL 7874

Figure 13: Typical sandy and at some areas gravely-sand soils within the EPL

5.5 Hydrology in //Karas Region

Influenced by the cold north flowing Benguela Current, maximum summer temperatures at Lüderitz lie below 31 °C, while minimum winter temperatures decrease inland from > 10 °C at the coast to between 5 and 6 °C on the higher ground (Atlas of Namibia, 1983). The area receives only marginal annual rainfall of less than 50 mm, which drain to the Koichab River in the north of the EPL or directly to the coast elsewhere. The Koichab River carries surface water only after periods of good rainfall in its source regions further inland and terminates in the Koichab Pan.

The local and regional geology was subjected to numerous events of deformation which led to the formation of geological folds, faults, fractures, and thrusts. Groundwater flow would occur mostly along fractures, faults (secondary porosity) and other geological structures present within the formations as well as through primary porosity in the unconsolidated top cover. However, the area lays within the Namib Basin and is underlain by a region with little or no ground water, therefore very little potential for underground water. Additionally, no known permanent natural fresh surface water sources exist near the EPL area.

Close monitoring is required as the coastal area is vulnerable to contamination as the result of waste streams produced during exploration activities. Waste may include hazardous waste (fuels, oils, hydraulic fluids, chemicals, batteries, contaminated soil, or water such as bilge water, etc.), non-hazardous wastes (metal, plastic, paper, glass and other forms of domestic waste, etc.), sewage and effluents. Hazardous waste poses a threat to workers on site and especially to the marine environment. Therefore, monitoring stations will have to be set up to determine the possible sources of contamination and methods of mitigation.

Figure 14 below shows the groundwater drought risk map. It is visible in the Figure, that there is a higher risk of groundwater drought inland and closer to the town of Lüderitz than to the EPL area, due to a lack of, or limited groundwater in the EPL area.

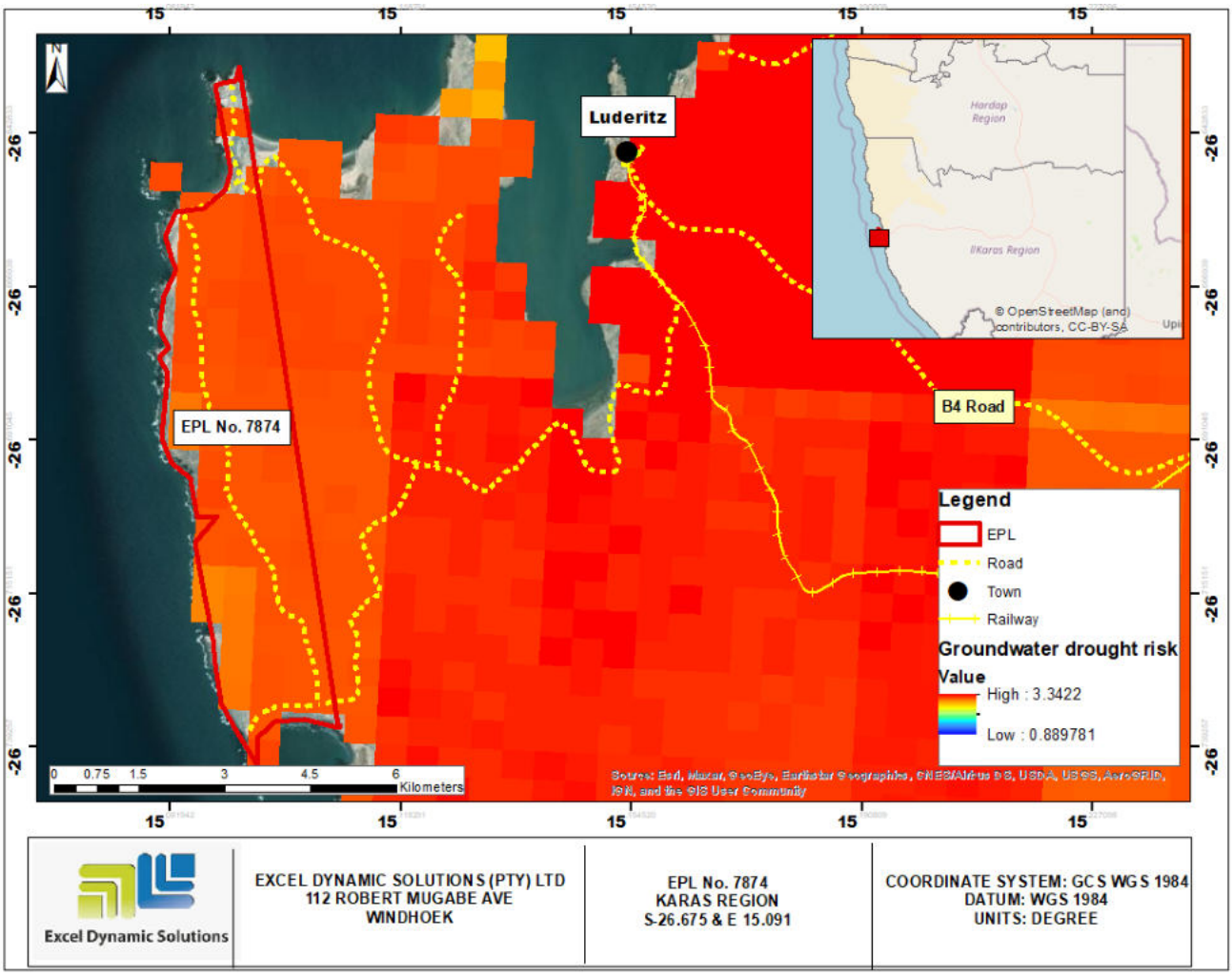


Figure 14: Map illustrating the Groundwater drought risk at EPL 7874

5.6 The Tsau //Khaeb National Park

Tsau //Khaeb National Park, formely known as Sperrgebiet (Prohibited or Restricted Area), (Tsau meaning Soft and //Khaeb meaning Sand) is newly proclaimed jewel in Namibia's protected area network. Since 1908 the largest part of the Tsau //Khaeb National Park was left undisturbed and closed to the public for nearly a century following the discovery of a diamond at Kolmanskop near Lüderitz by the railway worker, Zacharias Lewala. Although this was done to protect the mineral wealth of the area, it also contributed to safeguarding the Succulent Karoo ecosystem, which has the highest diversity of succulent flora globally (Ministry of Environment, Forestry and Tourism, 2021).

The Park has giant rock arches, meteor craters, fossil and archaeological sites including Africa's most important shipwreck discovery and some of the most pristine and wild landscapes on the planet. Some 1 050 plant species are known to occur in the park, nearly 25% of the entire flora of

Namibia on less than three per cent of the land area of the country. This led to the listing of the Succulent Karoo as one of the world's top 34 'biodiversity hotspots. Tsau //Khaeb National Park is one of a 'new eras' of protected areas, proclaimed to protect biodiversity while contributing to the local and national economy through tourism development and concessioning. The Tsau //Khaeb National Park and the nearest marine protected area are shown in **Figure 15** below.

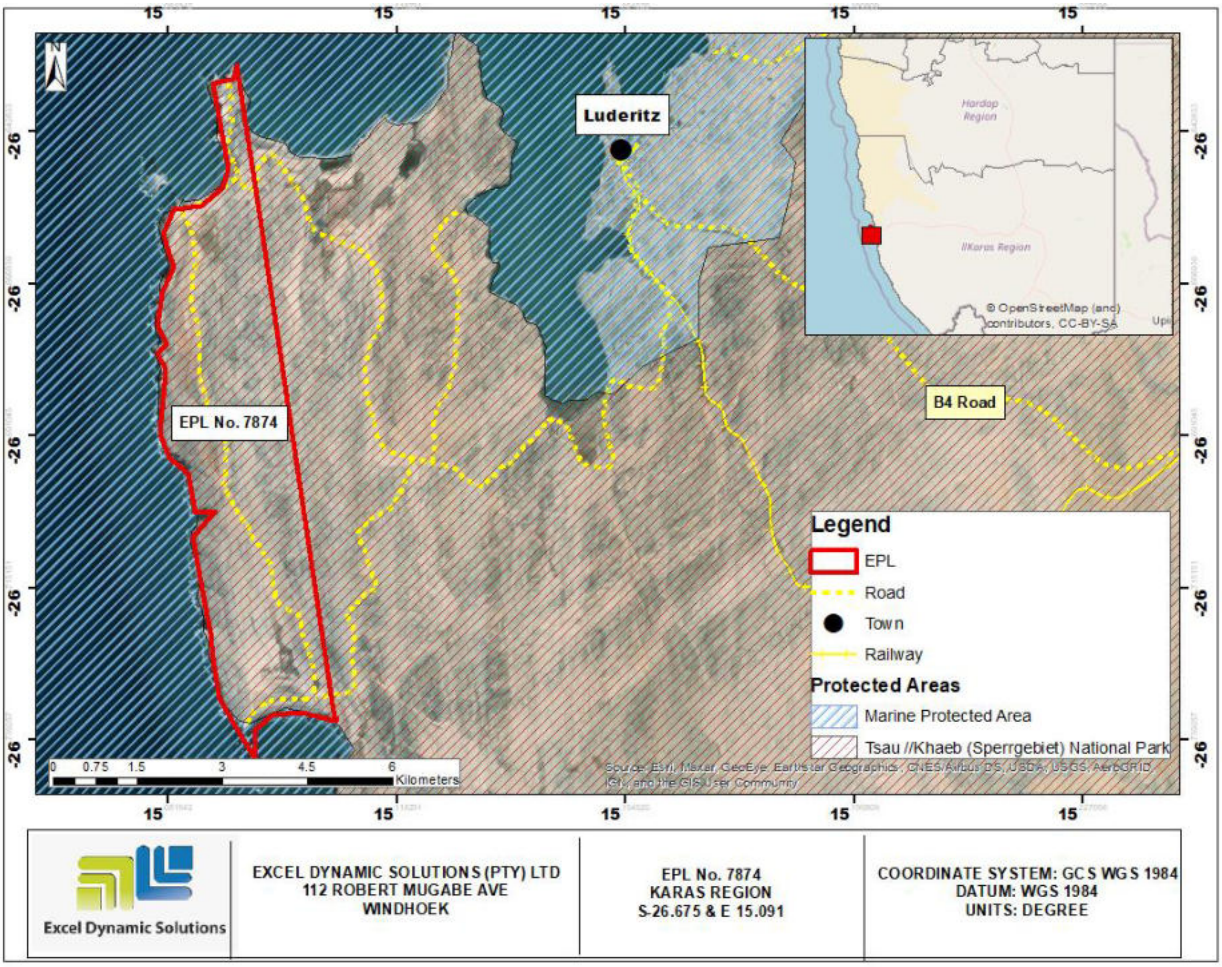


Figure 15: Map showing protected areas in EPL 7874

5.7 Ecology & Biodiversity: Fauna and Flora

5.7.1 General and Site Observations by the Environmental Consultant (EDS)

The EPL is located within the Tsau //Khaeb National Park, an area identified as an important are area for floral diversity. The Park, forms part of the country's protected area network. The Tsau ||Khaeb National Park, with its profusion of succulent plant species, has been classified by

conservationists as one of the world's top 34 Biodiversity Hotspots. To qualify for hotspot status, an area must contain at least 1 500 endemic vascular plants (0.5% of the planet's total). Prior to the establishment of the National Park, only 11% of the Namibian portion of the Succulent Karoo, which is home to 2 439 endemic plants, fell in protected areas. Now, with the park's proclamation, 90% is protected. Due to its world-famous diamonds, the National Park has been off-limits to the public for over a century and the habitat is largely untouched and pristine, making a visit to the Sperrgebiet National Park a truly unique wilderness experience (MEFT, 2008).

A. Fauna

The site is approximately 16 km away from the town of Lüderitz. The EPL and proposed project site and surrounding areas host significant biodiversity composition, structure, and processes. **Figure 16** shows the picture of the foot track of a jackal. **Figure 17** shows the Damara tern breeding ground, indicated as a clearly a sensitive marked off area.

Figure 16: Faunal (jackal) traces in the EPL area.

Figure 17: Breeding ground for the globally near-threatened *Sterna balaenarum* (Damara tern)

B. Flora

The vegetation of the National Park is defined by the Succulent Karoo, Namib Desert and Savannah biomes. The vegetation types include Succulent Steppe, Southern Desert, Riverine

Woodland. Quiver tree (*Aloe dichotoma*), many-stemmed quiver tree (*Aloe ramosissima*), vygies (Mesembryanthemum sp), Hoodia and Euphorbia spp. Sweet-thorn (*Acacia karoo*), camelthorn (*Acacia erioloba*) along riverbeds (Ministry of Environment, Forestry and Tourism, 2020).

The Lüderitz peninsula is part of the Succulent Karoo Biome with a succulent steppe vegetation type and dwarf shrub-land structure (Mendelsohn et al, 2002). The Succulent Karoo is a globally recognized biodiversity hotspot, rendered its status by its rich variety of endemic-rich flora and extensive habitat types (UNESCO WHC, 2021). Lüderitz Mariculture and the Lüderitz area in general, are situated in the Lüderitz Peninsula vegetation zone, yet because of the town's advancement this vegetation zone is exceptionally debased inside the residential territory.

The *Zygophyllum decumbens* is identified as the most dominant vegetation type in the EPL area. These are shrublets of the zygophyllaceae family, with decumbent branches (as shown on the map in **Figure 18.**

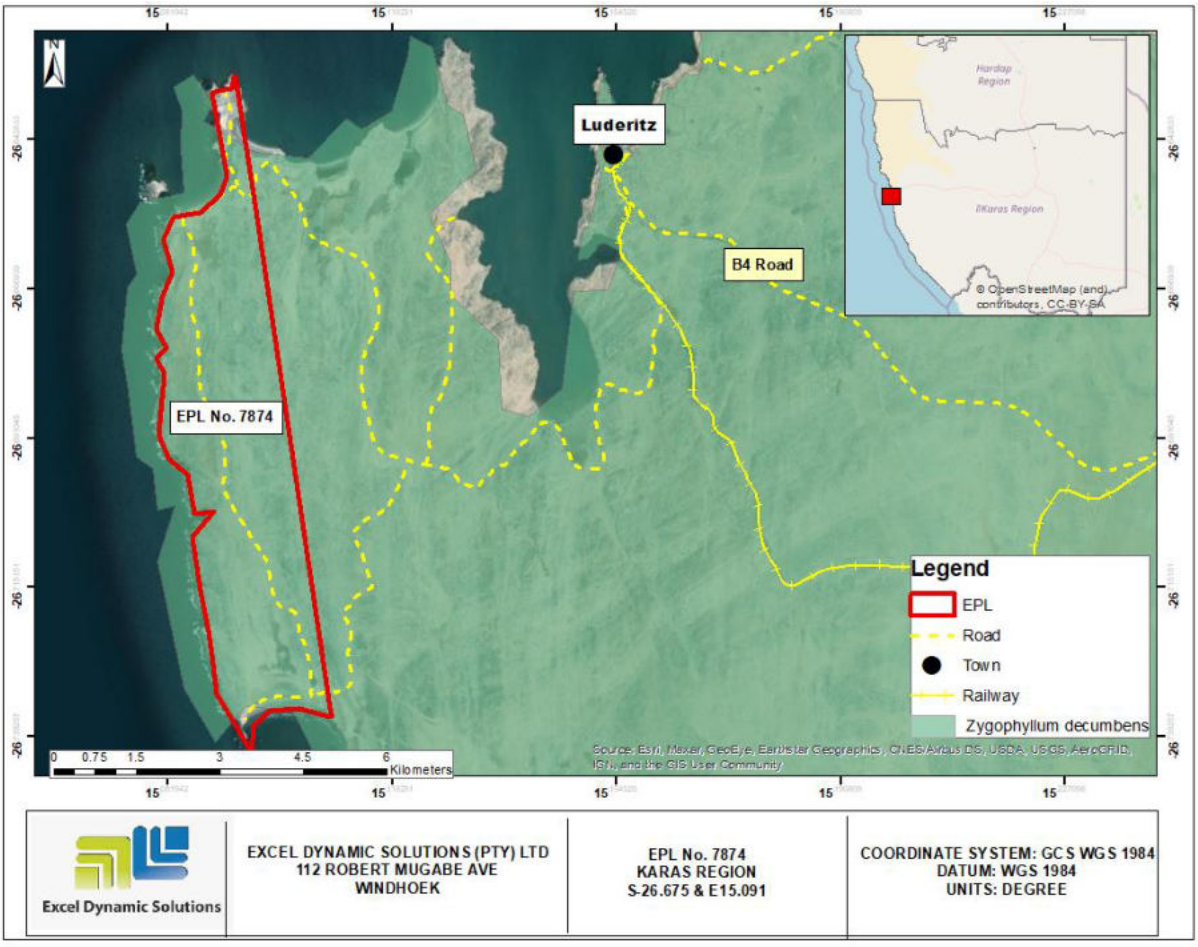


Figure 18: The dominant vegetation within EPL 7874

Some of the vegetation observed on site are shown in **Figure 19 and Figure 20** below.

Figure 19: Typical vegetation (Brownanthus species)

Figure 20: Typical vegetation (*Tripteris crassifolia)* found with EPL 7874

5.7.2 Ecology Baseline Description by a Specialist (Ecologist)

The reliable baseline information presented under this section for the EPL, and immediate areas have been sourced from and done by an independent Ecologist (specialist) under the report attached hereto as **Appendix D (Ecology Report – Desktop/Baseline Scoping)**. The summarized biodiversity information is presented below, and further reading is therefore referred to the specialist report (Appendix D).

A. Vertebrate Fauna

According to Cunnigham (2021), the general area is regarded as "low" in overall (all terrestrial species) diversity (Mendelsohn *et al.* 2002) while the overall terrestrial endemism in the area on the other hand is viewed as "average" (Mendelsohn *et al*., 2002). The overall diversity and abundance of large herbivorous mammals (big game) is viewed as "low" with 1-2 species while the overall diversity of large carnivorous mammals (large predators) is determined at 4 species with brown hyena being the most important with "medium" densities expected in the area (Mendelsohn et al. 2002 as cited by Cunnigham, 2021).

It is estimated that at least 32 reptile, 4 amphibian, 30 mammal and 97 bird species (breeding residents) are known to or expected to occur in the general/immediate area of which a high proportion – especially reptiles (56.3%) – are endemics (Cunnigham, 2021).

B. Flora

According to Maggs (1998) as cited by Cunnigham (2021), there are approximately 4344 higher plant species with the most species being within the grasses (422), composites (Asteraceae) (385), legumes (Fabaceae) (377) and fygies (Mesembryanthemaceae) (177), recorded from Namibia. Total species richness depends on further collecting and taxonomic revisions. High species richness is found in the Okavango, Otavi/Karsveld, Kaokoveld, southern Namib and Central Highland (Windhoek Mountains) areas. Endemic species – approximately 687 species in total – are manly associated with the Kaokoveld (northwestern) and the succulent Karoo (southwestern) Namibia. The major threats to the floral diversity in Namibia are:

1) Conversion of the land to agriculture (with associated problems) and,
2) poorly considered development (Maggs 1998, Mendelsohn et al. 2002).

Cunnigham (2021) continues that the vegetation in the Succulent Karoo Biome, which is associated with some winter rainfall and fog, has an astounding richness in plants – mostly low perennial shrubs (chamaephytes) – that have succulent leaves, branches and stems and are found extensively throughout the families Aizoaceae, Crassulaceae, Liliaceae and Euphorbiaceae and have many endemics as well as endangered or rare species (Lovegrove 1999). The dominant shrub throughout this biome is the pioneer species Galenia africana that colonises overgrazed and disturbed areas while the annuals are mostly represented by the family Asteraceae (Lovegrove 1999). This great diversity of plants makes it the most important botanical area in Namibia (Mendelsohn *et al*., 2002, Robertson *et al*., 2012).

The average plant production is extremely low with 0-5% variation in green vegetation biomass (Mendelsohn *et al*., 2002). The overall plant diversity (all species - "higher" plants) in the general area is estimated at less than 50 species in suitable/unique habitats. Plant endemism is relatively "high" with more than 26-35 species expected from the general area (Mendelsohn et al. 2002). Simmons (1998b) puts the plant endemism at between 41 to 50 species depending on the locality while Maggs (1998) estimates 180 species being endemic and almost 200 being near endemic. Burke (2003) estimates that over 5,000 species of plants occur in the Succulent Karoo Biome and at least 660 species in the northern regions of the Sperrigebiet with the biggest threats to the botany in this area being mining and illegal collection – e.g., most populations of the 'halfmens' (*Pachypodium namaquanum*) have been eradicated by unscrupulous collectors. Furthermore, very little is also known regarding many other species favoured by collectors – e.g., Lithops and Conophytum. Succulents are increasingly in danger due to various developments in southern Africa (Smith and Crouch, 2009). **The Tsau//Khaeb National Park (within which the EPL 7874 occurs) – most of which is pristine area – has more than 1,000 plant species comprising approximately 25% of the entire Namibian flora with numerous endemic and near-endemic species (Mannheimer *et al*., 2008). However, plant diversity decreases away from the species rich Lüderitz Peninsula (Burke, 2006).** Furthermore, Mendelsohn et al. (2002) views the grazing and browse as "very low" in the general area with the risk of farming viewed as "high" and the tourism potential of this area viewed as "average".

The EPL 7874 falls within the Lüderitz Peninsula dwarf-shrubland and the Rocky Coast dwarf-shrubland, both with a with a "very high" conservation importance (Burke, 2006).

I. Lüderitz Peninsula dwarf-shrubland

The extent of this vegetation type is 93.2km² or 0.43% of the Sperrgebied and one of the most diverse areas floristically with up to 330 species recorded (within the quarter-degree square associated with this mapping unit). Leaf-succulent dwarf shrubs and evergreen shrubs are the most prominent plant growth forms in the Lüderitz Peninsula dwarf-shrubland with the vegetation mostly <30cm in height due to being suppressed by the constant strong winds. The vegetation is very diverse and mainly associated with rocky substrate with the key species being *Brownanthus marlothii* and *Lebeckia multiflora*. There are many protected species, many with restricted range and high economic potential for the horticultural trade. These include *Conophytum, Crassula*, *Lavrania, Lithops* and *Ruschia* species. Endemics – minimum of 40 species – and lichens (high diversity) on the peninsula indicate the importance of this area floristically. The recovery potential is vied as "low", and threats include off-road driving; illegal plant collecting; invasive alien plants; infrastructure developments and quarrying (Burke, 2006).

5.8 Heritage and Archaeology

5.8.1 General and Site Observations by the Environmental Consultant (EDS)

The EPL covers most of the Tsau //Khaeb National Park. Previous Diamond mining activities have both scarred and spared the Tsau //Khaeb. The interior, due to the exclusion policy, has remained pristine, but the coastal areas where the diamonds occur have suffered considerable damage. Active mining in the distance proves that nature and industry can co-exist. The Namdeb Diamond Corporation has worked to restore damage caused by open-pit mining, re-vegetate spoil heaps and return affected areas to as near a natural state as possible (MEFT, 2008).

According to Risk-Based Solutions (2019), archaeological sites in the Lüderitz area consist mainly of small surface scatters of stone artefacts, and artefact debris. Small shell middens composed mainly of various limpet species with osteological evidence of penguin, fish and seals on the more recent sites also form part of the objects found on these archaeological sites. The numerous ghost towns, rusting fragments of railway and other historic items that still survive have been allowed to remain.

The Guano Bay, located on the northern section of the EPL contains sites of fossil bone leftovers, which serve as a sign of the historical occupation of the San groups in the area, and their diet. **Figure 21** below shows some of the animal bones and seal shell middens.

Figure 21: Leftover bones and seashell middens from historical occupation of the San people

Another heritage site on the EPL is the site of the original Diaz Cross at Diaz Point, erected by Bartolomeu Diaz in 1488. The Site of the Original Dias Cross was declared a national monument of 12 January 1973 (Namibia Stays, 2021). Additionally, at Diaz Point, a landmark of heritage significance, the red and white striped lighthouse (**Figure 22**) that was establishment in 1915 stands.

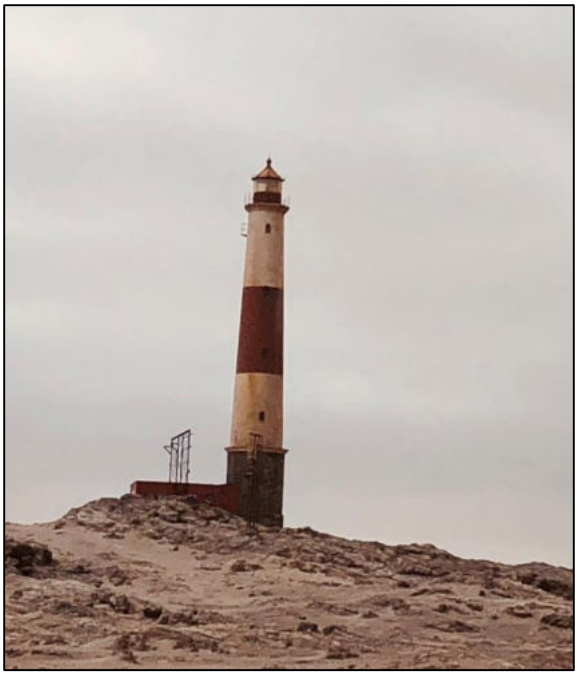


Figure 22: Lighthouse at Diaz Point

5.8.2 Archaeology Baseline Description by a Specialist (Archaeologist)

An Archaeological Assessment was undertaken to establish the baseline and provide site specific management and mitigation measures. These have been incorporated into this report under the and included in the draft EMP. The Archaeological Assessment report compiled for the assessment is attached as **Appendix E** for further reading.

//Karas Region is a highly significant archaeological landscape in Namibia (**Figure 23**) whose resources represent irreplaceable evidence of global importance. According to Kinahan (2000) as cited by Mowa (2021), it was in the late 15th century that Bartholomeu Dias erected a cross for the Portuguese crown before leaving a store ship in this area. He named the bay little bay or “Angra Paquena”. The cross that was erected is still visible today at Dias point. It is important to note that this is one of the major tourist attraction in this part of //Karas..In addition within EPL7874 are remnants of old diamond mining activities that are also visible in the form of abandoned buildings that resemble komanskop “Ghost town” located some 20 kilometres from the eastern boundaries of EPL 7874. In addition, a lighthouse is visible at the gravel road entrance to Dias point. It is however not clear whether the light house is currently operational or defunct and a relic of the past. As it is evident from the field work carried out in this area “Dias Point” is rich in cultural and archaeological heritage resources that are important to both the country and the region and are incomparable in their locality and contextual significance from any other in the country

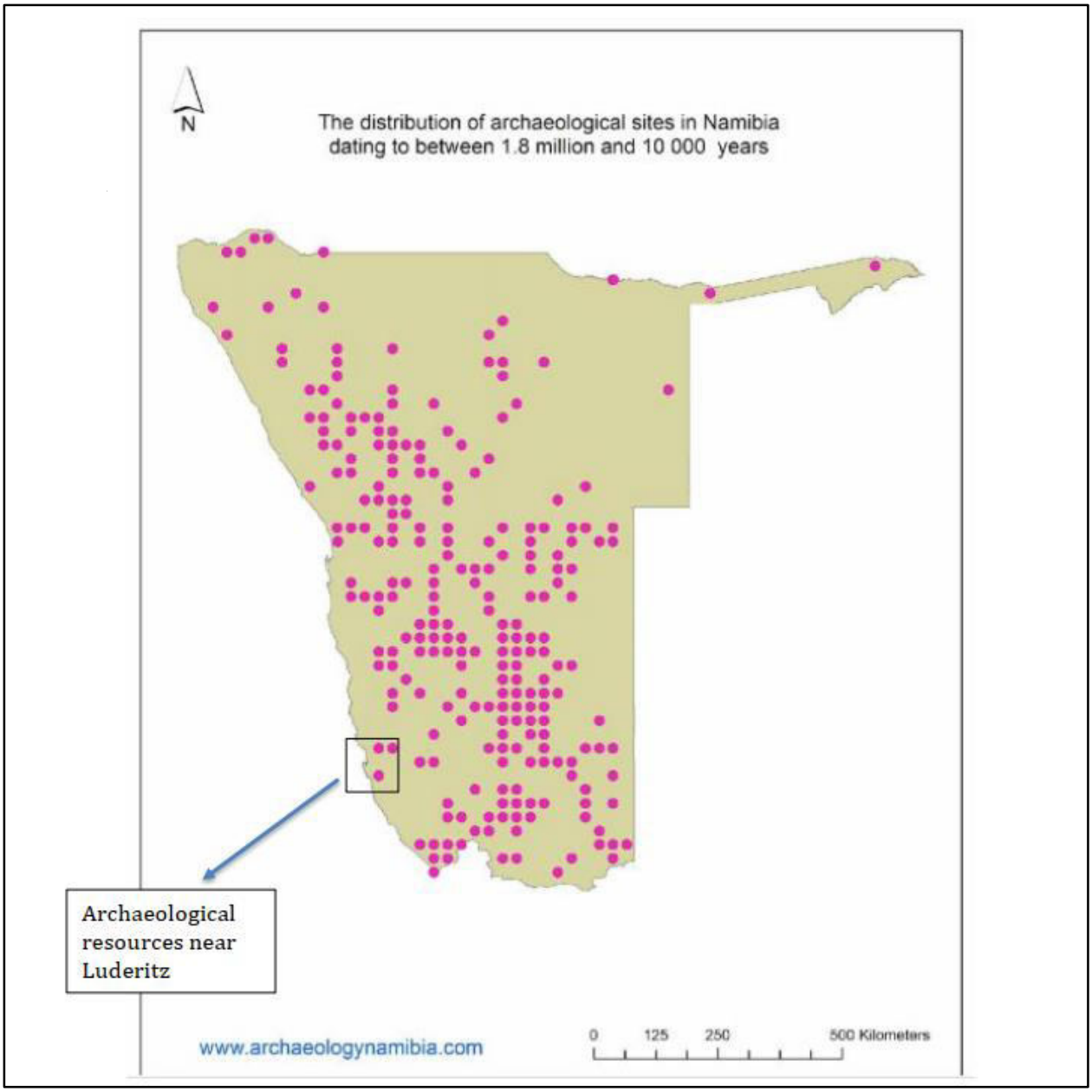


Figure 23: An edited map showing the distribution of archaeological sites (red dots) near Lüderitz, in relation to Namibia's distribution. The data are produced from the Namib Desert Archaeological Survey (Source: Kinahan J, 2021:7), Mowa, 2021

5.9 Visual Resource

When viewed from the perspective of a tourist, the natural landscape can be associated with a serene sense of place. The sense of place categorization as per Oberholzer (2005) for the zone of influence covered by the proposed project can be described as an area of medium scenic, cultural, and historical significance, owing to the importance of the tourist routes that passes

through the EPL area, and along with the tourism implications of the route itself. The focus of the project will be on delineated areas with prominent prospect results and the nature of the project is likely to provide a visual intrusion to the landscape without mitigation.

The proposed exploration activities (detailed exploration activities such as pitting and RC drilling) will temporarily change the visual environment given the presence of certain exploration equipment and vehicles at targeted sites of the EPL.

5.10 Historical Mining and related activities

Lüderitz is currently a town that mostly benefits from tourism to the ghost towns left behind in the desert. The few remaining land-based operations are near Oranjemund, with several small satellite mines near Lüderitz and alluvial mines along the Orange River.

History of Diamond Mining according to Laniado (2015)

A major diamond rush, located in Lüderitz (in the former German colony of Deutsch-Südwestafrika - German Southwest Africa) is among Namibia's most famous diamond sites. In 1907, the Germen railroad worker, August Stauch, heard that there may be diamonds in the area, and he asked railroad laborers to keep an eye out for sparkling stones along the railroads in the region. One of the laborers, who previously worked at the Kimberley diamond mine, found a diamond. Stauch resigned from his job with the railroad company and launched a systematic search for diamonds. In 1908, after finding several stones that were confirmed being diamonds, a major rush for diamonds began.

The authorities established the Sperrgebiet (Prohibited Area), limiting entry to the entire region to licensed miners, prospectors, and their laborers. This diamond mining area, located in the Namib Desert of southwestern Namibia, stretches from the Atlantic coast in the west to about 100 km inland, from the Orange River, on the border with South Africa in the south, to 72 km north of Lüderitz. It covers an area of 26,000 square km.

Although a desert, diamonds were found near the ground's surface, in what may have been riverbeds before drying up. These were the early days of large-scale diamond mining, which required innovation on the part of prospectors. The Plietz jigs, Schiechel pots and electric shovels were invented during this period.

In 1914, as WWI erupted and after seven million carats of diamonds were mined in the region, diamond mining was halted for nearly a year, until South African forces conquered the region, ending the German rule over Southwestern Africa. In 1920, Ernest Oppenheimer consolidated the region's pre-war diamond mining companies into a single entity called the Consolidated Diamond Mines (CDM) of Southwest Africa, later to be renamed CDM, which became part of De Beers.

In 1923, CDM was awarded the exclusive right to mine diamonds in Sperrgebiet and it went on to discover diamondiferous rocks along the ocean beach by and north of Orange River, thus developing one of the longest mined diamond resources. Over nearly 80 years, the company mined 65 million carats of high-quality large diamonds.

During the 1940s, as the mining emphasis moved to the shores and sea, CDM relocated its headquarters to the newly formed town of Oranjemund.

Modern Day Diamond Mining according to Laniado (2015)

Most of the diamond mining in Namibia is marine mining, along the coast and a few kilometers west into the sea. CDM was granted its first offshore mining license in 1961. This led to the development several innovations for mining in this new environment, including vacuum extractors, dredgers, floating treatment plants and probe drilling platforms. In addition, diamond mining ships were built to allow passage from the shallow waters of the coast. In 1994, CDM and the Government of Namibia agreed to form a new company, Namdeb Diamond Corporation. The company is equally owned (50:50) by the Government of Namibia and De Beers. Under the agreement, all De Beers Group mining licenses in Namibia and all related rights are replaced by a consolidated mineral agreement.

Following a new agreement with the government, De Beers helped the country set up local diamond manufacturing operations. In 2007, De Beers and Namibia formed another joint venture, Namibia Diamond Trading Company (NDTC). NDTC supplies diamonds to local companies for local manufacturing.

In November 2007, NDTC named 11 companies that will receive rough diamonds (a site) for a 3.5-year contract period ending in 2011. They received their first allocations in late October 2007. Another seven companies, which did not yet complete construction of their polishing facilities, began receiving supplies in late March 2008.

This project was part of a drive to expand Namibia's diamond revenues by creating a related industry in the country. The plan was to supply ~$300 million worth of rough diamonds to local diamond manufacturers by 2009, nearly 5 percent of Namibia's GDP. Over the years, diamond manufacturers repeatedly reported losses and over time, they were authorized to export rough diamonds unsuitable for local polishing to other countries, such as India and China. Today, NDTC supplies 11 manufacturers with rough diamonds by NDTC in Namibia.

5.11 Socio-Economic Status

5.11.1 Demography

During the 2011 Population and Housing Census, the number of inhabitants in the //Karas Region was assessed at 77,421 people (NSA, 2013). In 2016, an expected 85,759 people lived in the Region (3.7% of the public populace). The yearly development rate (2011 to 2016) for //Karas was determined at 2.0% (versus the public normal of 1.9%). //Karas Region is the least populated district (0.5 people per km^2) in Namibia (NSA, 2017a).

The degree of urbanization in the //Karas Region expanded from 54% (in 2001 and 2011) to 61% (2016), contrasted with the public normal of a metropolitan development pace of 45% in the range of 2001 and 2011 (NSA, 2013; 2017a). In 2011, the region had a record of 21,283 households (16,839 households in 2001). The quantity of households is assessed to have expanded to 26,348 out of 2016 (3.3 people per family).

Lüderitz being the closest human settlement to the EPL, its population is approximately 15,137 and the economy of Lüderitz depends heavily on the local fishing industry and the port. The expansion of the waterfront, increased passenger liners and the Crayfish Festival and other tourism activities have contributed to the growth of Lüderitz.

5.11.2 Lüderitz Socio-Economic Setting

Lüderitz is a centre for precious stone mining and fishing, including crayfish, white fish, and pilchards. The Port of Lüderitz is a significant fishing, mining/energy supply and minor import/export port. The economy is focused on the usage of the clean shielded waters for aquaculture purposes and the tourism advancement like cruising, kiting, fishing, and whale watching. It is evident that the tourism industry of the town, through activities such as tour boat operations, whale watching, rock lobster catching and other sporting exercises, is continuously expanding. The expansion of the waterfront, increased passenger liners and the Crayfish Festival and other tourism activities have contributed to the economic growth of Lüderitz (NamPower, 2019).

The following economic activities are undertaken around the project site.

5.11.3 Tourism

The //Karas Region is home to some tourist destinations in Namibia. According to the Luderitz Town Council (2021), efforts have been made to strengthen other economic sectors such as the budding tourism and logistics industries. Various bed and breakfast establishments, a three-star hotel, tour operators and restaurants offer an attractive package of amenities, activities and luxury accommodation for tourists, visitors, and travellers. Some of the Tsau //Khaeb National Park sites include the Museum at Kolmanskop Ghost Town, one concession to Pomona Ghost Town and Bogenfels Rock arch (**Figure 24**) from Lüderitz.

Figure 24: The 55-metre-high Bogenfels rock in the Tsau //Khaeb National Park (MEFT, 2021)

The local tourism industry has seen growth over the past few decades. The expansion of the waterfront, increased passenger liners, the international speed-week event and the Crayfish Festival and other tourism activities have contributed to this growth. However, the distance to and location of Lüderitz makes it difficult to attract tourists traveling Southern Africa by road (Lüderitz Town Council, 2020).

Since setting up camps is not allowed in the park, the tourists that visit sites in Lüderitz, near Lüderitz or transit through the Town are accommodated in Lüderitz. The location of the accommodation facilities is shown as green dots in **Figure 25**.

Figure 25: The location of some of the tourist accommodation facilities in Lüderitz

5.11.4 Mariculture and Ranching

According to Risk-Based Solutions (2019), commercial marine aquaculture is now dominated by oyster production (the Pacific *Crassostrea gigas* and European *Ostrea edulis* oysters). The methods used for production/harvesting include baskets suspended from rafts and longlines and onshore raceways as well as ponds.

5.11.5 Fishing and Aquaculture

Industrial fishing occurs in the project area's coastal side. Fishing activities in and around the Lüderitz area center on white fish (hake), tuna, crayfish, and oyster farming.

Aquaculture farming holds potential to offer an economically viable alternative to the main seasonal fishing activities. Abalone and Oysters are produced on a small scale but has already attracted international interest due to the oyster size and quality. Plans are under way to start aquaculture farming of tilapia (Lüderitz Town Council, 2021)

5.11.6 Recreation

There are some recreational activities in the vicinity of the project site. About 10 kilometers to the east the world-renowned ghost town, Kolmanskop, there is a spellbinding insight into what life was once like in this former diamond settlement. Other activities include bird-watching such as visiting Halifax Island to view Namibia's largest colony of African penguins, exploring the Lüderitz Peninsula and its many bays and beaches, whale watching, windsurfing, and speed-sailing (Travel News Namibia, 2019).

Lüderitz is especially famous for its delicious fresh seafood: west-coast rock lobster (called crayfish locally), oysters and the much-sought-after delicacy abalone (perlemoen variety). The town celebrates its rich seafood culture by presenting the annual Lüderitz Crayfish Festival.

According to comments submitted to EDS by some of the local community members, the Lüderitz Peninsula is a ‘*'place where people meet and escape the troubles of the day, to recharge and absorb the energy of the sea. It is a place where dreams can be found. There are several braai spots across the peninsula where you can have a private dinner or where families can join and share the beauty that develops in the evening sky. The beaches here are some of the safest and cleanest in Namibia. Experiencing the beach with kids helps to make you appreciate life and is truly invigorating"*.

5.12 Infrastructure and Services

5.12.1 Water Supply

The NamWater Koichab water supply plot supplies Lüderitz with consumable water. It comprises about nine production boreholes, providing groundwater from the alluvial aquifer formed in a paleo-channel of the Khoichab River.

5.12.2 Logistical Services

The main logistics activities in the //Karas Region are focused on the export of mining minerals, grapes, and fish. Imports include heavy machinery, equipment, and chemicals. Ship agency services are provided to the offshore diamond mining and oil and gas exploration activities

(Lüderitz Town Council, 2020). The port of Lüderitz provides direct access to shipping routes. It caters for shipping and offshore activity in the southern part of the country and provides access to markets in neighbouring countries.

The Lüderitz Town Council (2020) further stated that there are expectations of the repairing and upgrading of the railway will attract increased exports of commodities through the port of Lüderitz. Namport's plan to dredge and deepen the port will also attract larger vessels and help promote the port as attractive logistics import and export alternative for Southern African Development community (SADC) countries such as Botswana and South Africa.

5.12.3 Other services

The town of Lüderitz is furnished with services such as healthcare facilities, police station, fire station, fuel station, supermarkets, as well as mechanical services. Equipment and supplies are more readily available locally, and if specialized items necessary for project operations are not available in Namibia, such items can be outsourced regionally from neighbouring countries such as South Africa (Geo-Pollution Technologies, 2020).

The map showing the services and infrastructure in and around the project site is shown in **Figure 26**.

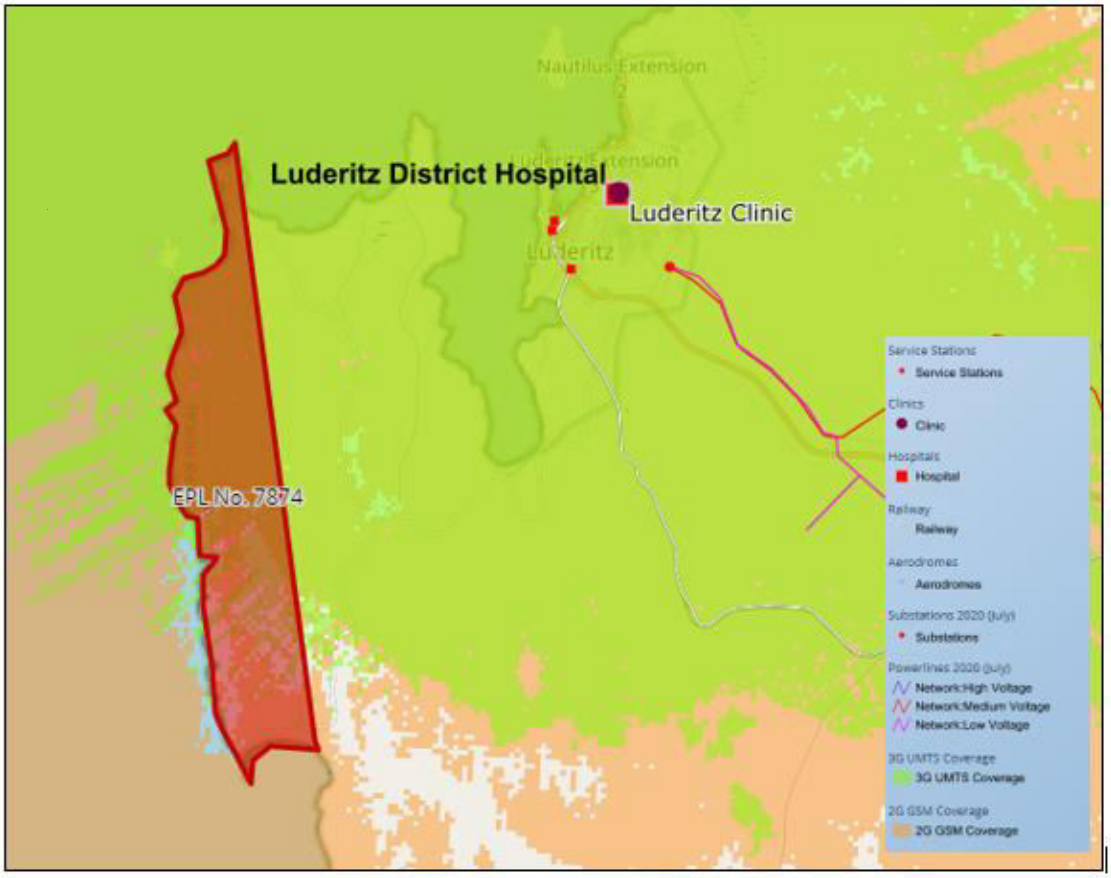


Figure 26: Types of services and infrastructure in and around Lüderitz

5.13 Socio-Economic Challenges faced by the Project Area

Like with some areas in Namibia, Lüderitz faces several challenges that hamper sustainable economic growth. According to the Lüderitz Town Council these challenges include:

- Financial Constrains for Land delivery
- Aging Infrastructure Electricity, Water, Sewerage & Road Infrastructure
- Heavy reliance on fishing and mining = risks of strikes, exchange rates flux, oil price.
- Topography of Lüderitz
- Lack of housing across sectors especially of informal settlements, illegal squatter, Compounds and Single Quarters
- Higher cost of business due to location
- Some Fishing quotas allocated to Lüderitz waters are processed in Walvis Bay.
- **Being in a national park, the Tsau //Khaeb National Park where restriction and prohibition are in place as well as development-specific permitting/authorization to develop or carrying certain activities may be required.**

6 PUBLIC CONSULTATION PROCESS

Public consultation forms an important component of an Environmental Assessment (EA) process. It provides potential Interested and Affected Parties (I&APs) with an opportunity to comment on and raise any issues relevant to the project for consideration as part of the assessment process. The public consultation process assists the Environmental Assessment Practitioner (EAP) in identifying all potential impacts and to what extent further investigations are necessary. Public consultation can also aid in the process of identifying possible mitigation measures. Public consultation for this project has been done in accordance with the EMA and its EIA Regulations.

6.1 Pre-identified and Registered Interested and Affected Parties (I&APs)

The Consultant identified relevant and applicable national, regional, and local authorities, local leaders, and other interested members of the public. Pre-identified I&APs were contacted directly, while other parties who contacted the Consultant after project advertisement notices in the newspapers, were registered as I&APs upon their request. Newspaper advertisements of the proposed exploration activities were placed in two widely read national newspapers in the region (*The Namibian Newspaper* and *New Era* Newspaper). The project advertisement/announcement ran for two consecutive weeks inviting members of the public to register as I&APs and submit their comments. The summary of pre-identified and registered I&APs is listed in **Table 5** below and the complete list of I&APs is provided in **Appendix F**.

Table 5: Summary of Interested and Affected Parties (I&APs)

National (Ministries and State-Owned Enterprises)
Ministry of Environment, Forestry and Tourism
Ministry of Mines and Energy
Ministry of Fisheries and Marine Resources
Ministry of Urban and Rural Development
Ministry of Labour, Industrial Relations and Employment Creation
Ministry of Health and Social Services
Ministry of Agriculture, Water and Land Reform
Ministry of Works and Transport
NamWater

Roads Authority
Regional, Local and Traditional Authorities
//Karas Regional Council
!Nami≠Nüs Constituency
National Heritage Council
General Public
Interested members of the public

6.2 Communication with I&APs

Regulation 21 of the EIA Regulations details the steps to be taken during a public consultation process and these have been used in guiding this process. Communication with I&APs with regards to the proposed development was facilitated through the following means and in this order:

- A Background Information Document (BID) containing brief information about the proposed facility was compiled (**Appendix G**) and hand delivered to relevant Authoritative Ministries.
- Project Environmental Assessment notices were published in *The Namibian newspaper* and the *New Era newspaper* (dates: **4 and 11 February 2021)** (**Appendix H**), briefly explaining the activity and its locality, inviting members of the public to register as I&APs and submit their comments/concerns.
- Public notices were placed at frequented places in Lüderitz town (**Figure 27**) to inform members of the public of the EIA process and register as I&APs, as well as submit comments.

Figure 27: Public notices placed in Lüderitz town

6.3 First Round Public Feedback

The Consultant held two public consultation meetings in Lüderitz on the 25th of February 2021 at the Turn Halle at two different time slots (First slot: 14:30, Second Slot 17:30). Requests for project registration (as an affected and interested party) were received in the form of emails, from some of the stakeholders. The issues, concerns, and inputs from stakeholders during the meetings and follow-up inputs were recorded and meeting minutes included as part of this report in **Appendix I**.

6.4 Second Round: Follow-up Communication

Upon sharing of the meeting minutes, EDS did receive comments and they have been incorporated into the Report attached as received under **Appendix J** (2nd Round of Public Participation). The comments were registered during the second round of public consultation (after the consultation meetings). The summary of significant (key) comments, concerns and response provided thereto by EDS are presented in **Table 6** below. The summarized comments in the Table were summarized from issues and concerns raised during the public meetings and via email.

Table 6: Summary of comments (concerns) received during & after the meeting and responses

Comment	In the Meeting or via email	EDS Response (addressing of comments)
The whole area is a fishing ground for the community. There is no other area we can harvest rock lobster. Previous exploration studies have occurred on the area. Mining affects the environment and leaves it un-useable. Marine resources will be destroyed and will not re-appear.	Public Consultation Meeting	Exploration activities will be limited to EPL areas further from the coastline so that these activities would not compromise the marine environment and affect the current activities such as fishing being undertaken. The management and mitigation to avoid and minimize the impacts of the prospecting and exploration activities on marine environment are indicated under the respective section of the Impacts Assessment Chapter as well as in the Environmental Management Plan (EMP).
We are not allowed to drive 4x4 vehicle in the area along the beach		Given the fact that there will be restriction and limitation to the site areas that can be explored on the coastal side of the EPL, the same rule would apply to the prospecting and exploration works to not disturb the beach routes.
We will not allow it to happen. Once it starts, there will be no going back. Even prospecting activity might cause us not to access the area		Noted. However, it should be noted that not all exploration works lead to successful (economic feasible findings) to covert the EPL into a mining license. Therefore, it is not guaranteed that exploration works would be completed nor result in a mine development. Furthermore, exploration may yield economic feasible results, but it is not guaranteed that the mining license or environmental clearance would be issued for the actual mining phase (pending full EIA and associated public consultations process – if mining would be proposed to continue after exploration, a separate EIA with its own project description (activities) and public consultation meetings would be required before issuance of mining environmental clearance).
The value of the Lüderitz Peninsula (Diaz Point) was explained. The existing routes are		The point was well taken, and opinion respected. However, this objection should be backed up by valid reasoning as to why the project should not

Comment	In the Meeting or via email	EDS Response (addressing of comments)
used for recreational and tourist activity. It is the only natural open area available for the residents. There is a protected marine reserve. I also have concerns about water supply mentioned in the BID. The town is highly dependent on tourism (Kolmanskop, Diaz Point). We are against this and will do everything to stop this.		be allowed to go ahead. We have had a thorough look at the opinion/objection, and this has been addressed under the relevant section of the Impacts Assessment. The addressing of the objection/issue will then be submitted to the Environmental Commissioner (at the Department of Environmental Affairs and Tourism (DEAF)) for evaluation and Environmental Commissioner's decision on the ECC
The constructed road leading to the peninsula took us many years to get access. The long-term impacts will be detrimental. In addition, it took us five years to rehabilitate minor disturbances to the area. The Proponent needs to walk away.		The road use by some prospecting works (not all prospecting work such as remote sensing and desktop study will need site presence) and eventual field work will be temporary (about 10 months) until cessation. Therefore, the impact on the roads will be short term. The assessment of this impact' significance and mitigation measures to reduce it, is however included in this Report under the Impact Assessment chapter
The prospecting and exploration methods		The methods have been presented under the Project Description chapter 2 and under the Exploration methods' Alternatives chapter (section 3.1.3).
We are objecting to this in principle because it is a protected area. Even if there may be diamonds. We still objecting it. I am irked by the fact that the BID does not explain methodology properly. Stay out, the area is for the people, the community. Just like central park in New York does not get developed, the Lüderitz peninsula does not get developed.		Yes, the EPL has unfortunately been mapped and registered in the protected area. As Environmental Consultants our duty is to only assess the environmental and social impacts that are anticipated from the proposed prospecting and exploration works on the EPL, present out findings (which includes the consolidation of public concerns, our response/how the public issues were addresses and our own research) to the Environmental Commissioner to make the final decision on whether to issue the environmental clearance or not.

Comment	In the Meeting or via email	EDS Response (addressing of comments)
This is one of the 10 biodiversity hotspots in the country. We want the experts to be involved now so that we can give input as well.		Noted. Normally specialists' studies are only involved at a full EIA level which is typically triggered by the type of activity, extent, magnitude, and duration, which would apply to the case of a developing mine. However, we find the detailed specialists' study to not be necessary during the scoping assessment for the prospecting and exploration works. However, we do take note of the ecological importance and sensitivity of the area and therefore measure has been provided to manage and mitigate the impact on biodiversity during the about 6 to 8 months' period of the physical presence onsite (10 months period is the total time for both prospecting and exploration).
Why was the Peninsula specifically chosen? And what is the nationality of the company		The Peninsula area has not been chosen as to say but it was mapped by the Ministry of Mines and Energy (MME) and part of the Peninsula area was found to bear potential of commodities and was as such marked as an EPL. The Proponent applied for rights to prospect and explore which was granted by the MME. The company/Proponent is Namibian.
It is a sensitive area. You say potential equipment, and these are all heavy equipment. We do not want any of that equipment in the area. It is sensitive for reptiles, seabirds, etc. We do not have a lot of water supply here to share with mining activity. It is a sensitive area; we do not want any large-scale prospecting or mining activity in the area. There should then		Yes, the proposed exploration equipment is heavy, and these are what would be required to undertake the work and get reliable data on the EPL. The prioritized method for the commodity of high preference which are precious stones (diamonds) will be trenching/pitting and only, if necessary, the Reverse Circulation will be applied. This invasive exploration method (pitting) would be ideal for the diamonds exploration as they are not usually found deep in such kind of environment (deposit within proximity of marine environment). However, to minimize the impact of such equipment presence and operation on local fauna, certain mitigation measures

Comment	In the Meeting or via email	EDS Response (addressing of comments)
be another meeting to inform us if these planned methods change.		provided under the relevant section under the Impact Assessment and EMP will need to be implemented. The water supply option will be to cart/truck water from elsewhere so that the activities do not put pressure on the existing local sources over that period of exploration (10 months). Should the proposed exploration method change, especially to diamond drilling which would require a lot of water (which is unlikely), this would be communicated with all the registered interested and affected parties.
Are there any areas identified as no-go areas? E.g. Halifax island farming of abalone? Will they operate 24-hrs? Will the sample area be rehabilitated before moving on to the next sample sites?		Unless the Ministry of Environment says there is a no-go area, it has not been zoned out. The No-go zone areas (buffer) will also be provided by the Ministry of Environment; Forestry and Tourism's Park Division as well as Ministry of Fisheries and Marines Resources with regards to the coastal side of the EP to protect and conserve the resources Yes, rehabilitation of excavated pits/trenches as well as exploration holes will be closed off after every completion of target sites. Please refer to section 2.6 of the Project Description (Decommissioning and Rehabilitation) and in the draft Environmental Management Plan (EMP). No, exploration works on site will be limited to daytime only between 8am and 17h00.
The moment something is found, there will be no access for the public		This concern is noted. However, limiting public access to the EPL may only be limited to certain areas of the site (EPL) but not the whole area. The limited access would also just be considered for the mining phase but not for exploration. Temporary public access could also be limited to certain

Comment	In the Meeting or via email	EDS Response (addressing of comments)
		(targeted) localised sites during exploration such as temporary equipment storage areas that would be significantly small.
EPL follows the west of the peninsula and is a marine protected area. The entire Lüderitz Peninsula is a non-mining area. How do they have an EPL?		The mapping and delineation of exploration licenses is done by the MME for the whole country, on both protected and unprotected areas as part of their mandate. Although, the EPL may have been delineated in this specific area where it also affects the Peninsula, this would not mean that prospecting and exploration works would be permitted on that side or portion of the EPL. The Ministry of Fisheries and Marine Resources will need to provide information on the specific areas of the EPL covering the Peninsula that area no-go or buffers to ensure that these areas are left untouched nor disturbed by the proposed project activities, even if the geological mapping component of the prospecting stage may yield high potential for further exploration.
You cannot work in the area like this because it has been agreed that this is a non-mining area.		That may be true however the fact that the MME has approved the EPL for prospecting and exploration (pending an environmental clearance) means that the Proponent gained the right to fulfil the requirements of their EPL approval, and that it is to apply for an environmental clearance to commence the prospecting and exploration within the allocated time (conditions to the EPL rights).
Water resources pollution from hydrocarbons and wastewater (sludge)	Email	Well noted. Mitigation measures on managing and mitigation the potential risk of pollution to both soils and water resources have been provided under the respective section of the Impact Assessment Chapter and in the EMP.

Comment	In the Meeting or via email	EDS Response (addressing of comments)
Air pollution (diesel and dust) a negative impact on fauna		Yes, this is a potential impact, and it has been assessed and mitigation measures provided thereto Impact Assessment Chapter and, in the EMP.
Impact on local tourism		This potential impact is likely, and it has been assessed and mitigation measures provided thereto Impact Assessment Chapter and, in the EMP
Impact on current and future conservation projects (Lüderitz Peninsula)		This potential impact has been acknowledged and it has been assessed and mitigation measures provided thereto Impact Assessment Chapter and, in the EMP
Impact on Archaeology and tourism, an example of Dias Cross		This potential impact has been acknowledged and it has been assessed and mitigation measures provided thereto Impact Assessment Chapter and, in the EMP. Given the presence of many objects of archaeological significance on the surface of the project area, the risk of similar or other unseen (buried) objects has been anticipated, therefore, an Archaeological assessment has been commissioned and a report has been compiled. The archaeological assessment report also contains site specific management and mitigation measures to minimize the risk of damaged archaeological resources on site, especially during pitting/trenching.
Impact on soils from creation of new access road tracks		The potential impact has been assessed and mitigation measures provided thereto (under the Impact Assessment Chapter and in the EMP).
Potential impact on marine reserves, along the Peninsula (from the western edge of the EPL)		As stated in this Table above (on the Peninsula), the Ministry of Fisheries and Marine Resources will need to provide information on the specific areas of the EPL covering the Peninsula that area no-go or buffers so that these are also included in the EMP to ensure that these areas are left untouched nor disturbed by the proposed project activities, regardless of the prospecting results.

Comment	In the Meeting or via email	EDS Response (addressing of comments)
Concern about lack of possible/exact sites for exploration drilling		The prospect/target site areas within the EPL will only be determined by the analysis and results of geological mapping, geophysical, soil and geochemical surveys, therefore it would be misleading and unreliable to provide the exact locations of drilling without conducting and completing the surveys and mapping (exploration is a phased activity). These will aid in delineating specific sites for drilling but not the entire EPL area.
Water use and availability (impact on local sources)		The impact on local resources has been assessed and mitigation measures provided herein (under the relevant section of the Impact Assessment Chapter and in the EMP).
The size of the prospecting pits/trenches need to be provided		The pits are expected to be excavated to the depths of 3 to 6 meters. Diggers excavate rapidly and pits 3–4 m deep can be dug, logged, sampled, and re-filled within an hour. In cooler and moister weather conditions, thick lateritic soil forms ideal conditions for pitting.

6.5 Third Round of Public Consultation: Upon Circulation of the Draft ESA Report

The draft ESA Report was circulated to the registered I&APs for review and comments for a fifteen (15) day period, i.e., from the 1st of June to the 15th of June 2021. A 4-page letter containing comments/points was received by EDS from one I&AP dated 15 June 2021. Another letter of feedback was also received from the Ministry of Fisheries and Marine Resources (MFMR) dated 03 August 2021 – **this letter was received late because MFMR also acted as a relevant competent authority due to the presence of a marine sensitive area in proximity of EPL7874, hence the need for a consent letter**. Therefore, the draft ESA report had to be reviewed by different relevant persons within the ministry before responding to EDS.

The significant comments received are summarized in **Table 7** below and provided in full as received in **Appendix K (original formats of comments received).**

Table 7: Summary of key (significant) comments from the review of draft ESA Report and responses

Issue	Concern	Section where the issue has been addressed
Ecology/Biodiversity	The need for a specialist (Ecology/Biodiversity) Study to properly assess the potential impact on biodiversity.	The Ecology (Specialist) Study was conducted and attached hereto as Appendix D. The impact has also been assessed under Section 7.3.4 of the impact assessment chapter.
Specific commodity of interest for exploration	Diamond is not the primary commodity the primary sought-after commodity, which is questionable, seeing that the entire general area has been or is being targeted for diamonds. What then is the primary target commodity? Knowing what is targeted would help to understand the likely landscape features / habitats to be targeted, their extent (and therefore the likely scale of the exploration activities) and the methods used to explore the EPL.	Diamond is just one of the commodities that the EPL has potential for in addition to Base Metals, Rare and Precious Metals, Semi-Precious. The Proponents or EPL holders however may be interested in some of the commodities but not all within their EPLs or they could prioritize the other commodity(ies) as primary and others as secondary once encountered when exploring for the primary commodities of interest.

Issue	Concern	Section where the issue has been addressed
		Please refer to the clarification under the second paragraph of chapter 2 (page 7).
Fencing of the EPL and impact on local tourism, recreation, commercial mariculture, and kelp wrack harvesting project	If diamonds are the most likely commodity to be explored for, then this would mean that the EPL will be fenced off, hence the impact on local tourism. The fencing of the EPL would mean loss of recreational space and for lobster fishing opportunities.	There will be no fencing off the EPL area for exploration activities. However, localized and temporary fencing may be done, when necessary, for instance in the case of some shallow exploration trenches that may need to be open for some time during exploration and pose as a risk of people or animal falling in to cause injuries.
The project's No-go option and the existing land uses (economic activities)	What about listing any positive aspects, including economic reasons, such as no loss of tourism revenue, including direct and indirect jobs in the tourism industry? Or preservation of a unique and fragile ecosystem, including lichen fields and Damara Tern roosting and breeding sites?	The exploration activities will be focused on certain target site areas within the EPL but not the entire area. This will be done to ensure that existing land used such as tourism and ecosystems are preserved and not significantly impacted negatively. The lichen fields and roosting and breeding sites have been preliminary identified and marked by the Ecologist (Appendix D) to exclude.
Demarcation of sensitive and no-go areas	The EAP with the help of a specialist to provide maps (buffers) of sensitive and no-go areas (such as lichen fields and Damara Tern breeding pans) for the project.	This has been done and incorporated under the impact assessment chapter 7, section 7.3.4.
Missing legal framework and an update on climate component of the baseline	The request to add other relevant legal requirements to the project as well as updating of the climatic conditions for the Lüderitz Peninsula area.	These has been noted and added and amended accordingly under the relevant section of the ESA Report.

Issue	Concern	Section where the issue has been addressed
An improvement on the Ecology description and assessment	No mention of the Lüderitz Peninsula Dwarf Shrubland or Lüderitz Plain Dwarf Shrubland and the most important species within the EPL being the saltbush, *Salsola nollothensis*.	Please refer to the Specialist Ecology Report (Appendix D).
Correction on Figure 18 and 19 of the Draft Report	The species in Figure 18 is also not *Mesembryantheumum cryptanthum*, but more likely a *Brownanthus* species. Figure 19 shows *Tripteris crassifolia* and not *Didelta carnosa* as alleged.	Noted. This has been corrected accordingly.
Portraying of certain information / Figures in the Draft Report	Tourism: why show Bogenfels arch? This is completely irrelevant to the assessment	The Bogenfels arch has been included in the Baseline environment to indicate the tourism attraction sites in the surrounding area (and not only site specific), a typical write up of any EIA Study.
Loss of biodiversity	The no-go sites should be clearly demarcated, and the breeding sites that should not be disturbed need to be demarcated.	Noted. This has been done and included in Figure 29 under the impact assessment.
	The impact of using water during exploration activities on the micro-ecology of the affected area. This is an arid area and plant/animal life is adapted to this. What are the potential impacts of using water in an area that is generally devoid of water? Is it likely to kill the local vegetation? Flood animal burrows?	The water to be used for exploration activities will not be sourced from the site sources such as boreholes or drill new boreholes but arrangements will be made to purchase water from the Lüderitz Town Council to supply for the duration of the exploration activities. It is unlikely that a significant amount of water will be used in such volumes that can lead to complete deterioration of vegetation and

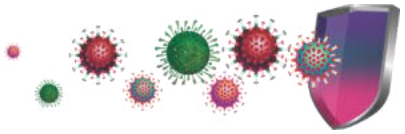
Issue	Concern	Section where the issue has been addressed
		animals. However, care will be emphasized for implementation in the EMP to ensure that the impact is managed adequately.
Clarification on exploration works within the EPL of the Peninsula	Page 92 of the EIA/Page 23 of the EMP: "The Proponent should avoid carrying out exploration works within the Peninsula area of the EPL or within 5 km of the Peninsula boundaries". Since the entire EPL falls onto the peninsula, that means no exploration work should be carried out in the EPL?	This has been revised and updated to rather ensure that the exploration works are only undertaken at the target site areas that will not adversely impact the environment such as the ecology as demarcated from the Ecology Report to exclude the marked sensitive ecological areas.
Exploration works on tourism	Explain how exploration activities and other existing land uses such as tourism are supposed to co-exist efficiently? How do exploration activities NOT hinder tourism activities – in an area that draws visitors with their (relatively) unspoiled landscapes and views?	The duration, extent and magnitude of the exploration works will be limited to certain areas of the EPL and not the whole EPL. The works are also limited in time (a period of 10 months only and not indefinitely) and space (only selected EPL site areas that will be trenched and drilled, if necessary, for instance).
Vehicle movements within the Peninsula	How would the project workers not "drive around other land use sites" if the entire peninsula, including the entire EPL, is primarily used for tourism?	The project vehicles will be required to follow the existing routes and only create temporary new ones when required to access the selected site areas within the EPL where there are no existing routes. This will be done having the sensitive of the desert soils in mind too to ensure that the new routes are as minimal as possible.
Rehabilitation and restoration of explored sites	Please define the terms "rehabilitation" and "restoration". Is this only visual habitat restoration or	Rehabilitation referred to for the exploration activities will entail the dismantling and removal of

Issue	Concern	Section where the issue has been addressed
	functional habitat restoration?	structures from the project site and area, removal of drilling casting, and/ or concrete plinths, clean-up of the site working areas, progressive backfilling of exploration pits, trenches, and capping of exploration boreholes to ensure that they do not pose a risk to both people and animals in the area. This will also include the leveling of stockpiled topsoil and where possible, revegetate to ensure that the disturbed land sites are left and restored to their pre-exploration state as much as possible.
Waste generation	Litter of any nature needs to be contained in closed containers, so it does not blow away in strong wind and to remain out of reach of crows, jackals and hyenas.	This has been included under the waste management section 7.3.10.
Noise and vibrations:	What about noise, including drilling and blasting noise on local wildlife (particularly since they don't stick to a "working hour" schedule), including protected birds such as penguins, cormorants, gulls, terns and oystercatchers nesting on Halifax Island?	There will be no blasting on site. However, noise and drilling will be managed as per mitigation measures provided under section 7.3.12.
Decommissioning and rehabilitation	This section is vague as best and does not provide any tangible guidelines or mitigation measures that would constitute a sound rehabilitation effort.	The measures provided will be implemented and efforts of such implementation will be monitored and reported during the Environmental Compliance Monitorting.

Issue	Concern	Section where the issue has been addressed
Public participation process:	As mentioned in the draft report, two public meetings took place in Lüderitz (both on the same day, to cater for covid-related group size restrictions). It became apparent during the meetings that the EAP was ill prepared for fielding questions and answering concerns from the public. From the public's point of view (and this is reflected in the summary given in Appendix J of the report), the information given in the BID and during the two public meetings was scant and not particularly useful. As such the public participation process was flawed and another round of such meetings should be considered by the EAP to be able to answer the community's questions properly	EDS believed that the public consultation meetings were done sufficiently because the aim of the meetings was to get concerns and comments from the public which EDS indicated to the attendees. The public input would then be used as basis to compile the ESA Report and the reason the draft ESA Report was shared with the public/registered I&APs to review and comment again. The BID is usually compiled prior to the public meetings as a summary of the project activities and ESA process with limited information pending public input. Therefore, not the complete project document or ESA Report to conclude the whole project on. In meetings, the EAP would normally answer questions that he can answer truthfully and with certainty. However, for the questions that he cannot answer right away in meetings (to avoid giving false information), he always takes notes of such questions to take time, research and where the Proponent's response is required, he then request for answers to such questions and provide answers either in the meeting minutes or in the form of incorporating these in

Issue	Concern	Section where the issue has been addressed
		the relevant sections of the ESA Report.
Impact on Marine Ecology	The proposed area is near the Namibian Islands Marine Protected Area (NIMPA) Ecologically or Biologically Significant Marine Area (EBSA) that is in the central region of the BCLME within Lüderitz Upwelling Cell. A full EIA including detailed specialist studies, specifically regarding the activity's ecological impacts on the sensitive receiving environment of the proposed area.	The potential impact on the site and nearest marine ecological environmental has been accessed in the Ecology (Vertebrate fauna and flora expected to occur in the EPL 7874, Lüderitz area) Report attached hereto as **Appendix D**. The potential impact on the ecology has been described, assessed and recommendations provided thereto in the Ecology Report. The assessment has been incorporated into this ESA Report under section 7.3.4.

6.6 COVID-19 Influence



COVID-19 has changed the way the world thinks, acts, and does business. The pandemic has forced a comprehensive review of business practices, a higher level of engagement with technology to offset the constraints due to social distancing, restrictive travel, and a focus on social responsibility. The consulting team has had to change very little in the way we operate and provide public consultation services.

Although the team operated with limited travel during the environmental assessment to comply with the regulations put in place, various other platforms were used to communicate the project information. These platforms included emails, registered mails, newspaper adverts, and telephonic communication.

During assessment, the consulting team continuously practices social distancing, wearing of facemasks and regular washing/sanitizing of hands.

7 IMPACT IDENTIFICATION, ASSESSMENT AND MITIGATION MEASURES

7.1 Impact Identification

Proposed developments/activities are usually associated with different potential positive and/or negative impacts. For an environmental assessment, the focus is placed mainly on the negative impacts. This is done to ensure that these impacts are addressed by providing adequate mitigation measures such that an impact's significance is brought under control, while maximizing the positive impacts of the development. The potential positive and negative impacts that have been identified from the prospecting activities are listed as follow:

Positive impacts:

- Potential for creation of temporary job positions for locals, especially the non-skilled labourers.
- Boost the local and regional economic development, i.e., economic diversification.
- May open other investment opportunities in the Region.
- Contribution to regional economic development.

- If mining commences (upon discovery of the economic feasibility of the target areas), the project will contribute to community development through community social responsibility (CSR).

Negative impacts:

- Physical land/soil disturbance
- Potential land use conflict (tourism, conservation, recreation, and exploration)
- Pressure on water resources (availability and use)
- Land Degradation and Loss of Biodiversity
- Dust Generation
- Waste Generation
- Impact on visual and tourism
- Potential Occupational Health and Safety Risks
- Possible disturbance Archaeological/Heritage Resources
- Noise and Vibrations from detailed exploration works, and
- Increase in Vehicular traffic flow.

7.2 Impact Assessment Methodology

The Environmental Assessment process primarily ensures that potential impacts that may occur from project activity are identified and addressed with environmentally cautious approaches and legal compliance. The impact assessment method used for this project is in accordance with Namibia's Environmental Management Act (No. 7 of 2007) and its Regulations of 2012, as well as the International Finance Corporation (IFC) Performance Standards.

The identified impacts were assessed in terms of scale/extent (spatial scale), duration (temporal scale), magnitude (severity) and probability (likelihood of occurring), as presented in **Table 8**, **Table 9**, **Table 10,** and **Table 11**, respectively.

To enable a scientific approach to the determination of the environmental significance, a numerical value is linked to each rating scale. This methodology ensures uniformity and that potential impacts can be addressed in a standard manner so that a wide range of impacts are comparable. It is assumed that an assessment of the significance of a potential impact is a good

indicator of the risk associated with such an impact. The following process will be applied to each potential impact:

- Provision of a brief explanation of the impact,
- Assessment of the pre-mitigation significance of the impact; and
- Description of recommended mitigation measures.

The recommended mitigation measures prescribed for each of the potential impacts contribute towards the attainment of environmentally sustainable operational conditions of the project for various features of the biophysical and social environment. The following criteria were applied in this impact assessment:

7.2.1 Extent (spatial scale)

Extent is an indication of the physical and spatial scale of the impact. **Table 8** shows rating of impact in terms of extent of spatial scale.

Table 8: Extent or spatial impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Impact is localised within the site boundary: Site only	Impact is beyond the site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond site boundary: Regional	Impact extend National or over international boundaries

7.2.2 Duration

Duration refers to the timeframe over which the impact is expected to occur, measured in relation to the lifetime of the project. **Table 9** shows the rating of impact in terms of duration.

Table 9: Duration impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Immediate mitigating measures, immediate progress	Impact is quickly reversible, short-term impacts (0-5 years)	Reversible over time; medium term (5-15 years)	Impact is long-term	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

7.2.3 Intensity, Magnitude / severity

Intensity refers to the degree or magnitude to which the impact alters the functioning of an element of the environment. The magnitude of alteration can either be positive or negative. These ratings were also taken into consideration during the assessment of severity. **Table 10** shows the rating of impact in terms of intensity, magnitude, or severity.

Table 10: Intensity, magnitude, or severity impact rating

Type of criteria	Negative				
	H- (10)	M/H- (8)	M- (6)	M/L- (4)	L- (2)
Qualitative	Very high deterioration, high quantity of deaths, injury of illness / total loss of habitat, total alteration of ecological processes, extinction of rare species	Substantial deterioration, death, illness or injury, loss of habitat / diversity or resource, severe alteration or disturbance of important processes	Moderate deterioration, discomfort, partial loss of habitat / biodiversity or resource, moderate alteration	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers	Minor deterioration, nuisance or irritation, minor change in species / habitat / diversity or resource, no or very little quality deterioration.

7.2.4 Probability of occurrence

Probability describes the likelihood of the impacts occurring. This determination is based on previous experience with similar projects and/or based on professional judgment. **Table 11** shows impact rating in terms of probability of occurrence.

Table 11: Probability of occurrence impact rating

Low (1)	Medium/Low (2)	Medium (3)	Medium/High (4)	High (5)
Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, continuous. High risk or vulnerability to natural or induced hazards.

7.2.5 Significance

Impact significance is determined through a synthesis of the above impact characteristics. The significance of the impact "without mitigation" is the main determinant of the nature and degree of mitigation required. As stated in the introduction to this section, for this assessment, the significance of the impact without prescribed mitigation actions is measured.

Once the above factors (**Table 8**, **Table 9**, **Table 10,** and **Table 11**) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

SIGNIFICANCE POINTS (SP) = (MAGNITUDE + DURATION + SCALE) X PROBABILITY

The maximum value per potential impact is 100 significance points (SP). Potential impacts were rated as high, moderate, or low significance, based on the following significance rating scale (**Table 12**).

Table 12: Significance rating scale

Significance	*Environmental Significance Points*	*Colour Code*
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	1 to 30	L
Neutral	0	N
Low (negative)	-1 to -30	L
Medium (negative)	-30 to -60	M
High (negative)	<-60	H

Positive (+) – Beneficial impact

Negative (-) – Deleterious/ adverse Impact

Neutral – Impacts are neither beneficial nor adverse

For an impact with a significance rating of high (-ve), mitigation measures are recommended to reduce the impact to a medium (-ve) or low (-ve) significance rating, provided that the impact with a medium significance rating can be sufficiently controlled with the recommended mitigation

measures. To maintain a low or medium significance rating, monitoring is recommended for a period to enable the confirmation of the significance of the impact as low or medium and under control.

The assessment of the exploration phases is done for pre-mitigation and post-mitigation

The risk/impact assessment is driven by three factors:

- **Source**: The cause or source of the contamination.
- **Pathway**: The route taken by the source to reach a given receptor
- **Receptor**: A person, animal, plant, eco-system, property or a controlled water source. If contamination is to cause harm or impact, it must reach a receptor.

A pollutant linkage occurs when a source, pathway and receptor exist together. Mitigation measures aim firstly, avoid risk and if the risk cannot be avoided, mitigation measures to minimize the impact are recommended. Once mitigation measures have been applied, the identified risk would reduce to lower significance (Booth, 2011).

This assessment focuses on the three project phases namely, the prospecting, exploration (and possible analysis) and decommissioning. The potential negative impacts stemming from the proposed activities of EPL 7874 are described, assessed and mitigation measures provided thereof. Further mitigation measures in a form of management action plans are provided in the Draft Environmental Management Plan.

7.3 Assessment of Potential Negative Impacts: Surveys, Drilling, Sampling Phases

The main potential negative impacts associated with the operation and maintenance phase are identified and assessed below:

7.3.1 Pressure on Water Resources

Groundwater resources is potentially impacted by project developments/activities in two ways, namely through pollution (water quality) or over-abstraction (water quantity) or at times both. However, this section only deals with the impact on water quantity with regards to the water requirements given under Chapter 2 (the quality is discussed under section 7.3.3).

The required water of about 6000 litres per day will be used for drilling purposes and cooling of drilling equipment. Fresh water is already limited in the area, and groundwater resources are minimal to non-existent. Based on the groundwater potential map of Namibia, the groundwater potential in the project site area is very low and limited to generally low and locally moderate (Christelis and Struckmeier, 2001), therefore scarce. The abstraction of more water from an area with low and limited groundwater potential than it can be replenished by either natural or artificial recharge) would negatively affect the local communities that depend on the same ("struggling") groundwater resource (aquifer) and low yielding boreholes. The abstraction of water from the local aquifers would be felt during the duration of the detailed exploration activities (where significant amount of water would be required compared to mere prospecting). However, the impact of the project activities on the resources would be dependent on the water volumes abstracted and required by each or a certain project activity. Commonly exploration activities use a lot of water, mainly diamond drilling that is more water-consuming compared to drilling methods such as reverse circulation for instance), number of exploration boreholes required to make reliable interpretation on the commodity explored for as well as the type of mineral (commodity) being explored for.

The drilling method to be employed for this project's exploration activities is Reverse Circulation. The required water for exploration is about 50,000 litres per month amounting to an average of 1 600 litres per day. The water required for both exploration activities such as drilling, ablution and drinking will be a combination of carted water from elsewhere outside the project area (mainly and for drilling activities such as cooling and washing drilling equipment) to be stored in industry standard water reservoirs/tanks on site and Town Council water supply (for drinking and ablution). However, given the duration of these project activities and indirect water abstraction from primary sources, the potential impact would be short-term, therefore of slightly medium significance.

Without the implementation of any mitigation measures, the impact can be rated as slightly medium, but upon effective implementation of the recommended +measures, the impact significance would be reduced to low as presented in the **Table 13** below.

Table 13: Assessment of the impacts of exploration on the water resources

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	M/H - 4	M - 6	M/H - 4	M – 48
Post mitigation	L/M - 2	L/M - 2	L/M - 4	L/M - 2	L - 16

Management and Mitigation measures to reduce pressure on water resources

- Abstraction of water from local aquifers should be avoided at all costs by ensuring that part of the required water is sourced from the Lüderitz Town Council water supply line (through agreed purchase) and or augmented by carted water from areas with better supply.
- The Proponent should prioritize carting water from outside the project area (for specific exploration activities such as drilling/cooling of equipment) and reach an agreement with the Lüderitz Town Council to supply water for drinking (to augment the project water needs).
- Although water will not be abstracted from the local aquifers, the water user (Proponent) should be water-use conscious and consider voluntary water use reduction by sticking to their proposed threshold volumes or less when more water is not really required.
- The Proponent should aim to use water efficiently, recycle and re-use where necessary and possible.
- Water reuse/recycling methods should be implemented as far as practicable for exploration activities. The water used to cool off exploration equipment should be captured and used for the cleaning of project equipment, if possible.
- Water conservation awareness and saving measures training should be provided to all the project workers in both phases so that they understand the importance of conserving water and become accountable.

7.3.2 Physical Land (Soil) Disturbance and Degradation

The exploration activities such as excavations and land clearing to enable siting of equipment will potentially result in soil disturbance which will leave the site soils exposed to erosion and compaction. This impact is probable since most areas of the project site have little to no vegetation or grass cover that would help to hold the soils in place with their roots and the fact that desert soils are prone to disturbance and erosion. The land disturbance would also lead to increased soil erosion and the loss of plant cover within cleared and disturbed areas.

The impact can be rated as medium high if no mitigation measures are implemented. However, with the effective implementation of mitigation measures and monitoring, the impact significance will be reduced to medium and eventually low. The impact is assessed in **Table 14** below-

Table 14: Assessment of the impacts of exploration on the physical land (soils)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	M/H - 4	M - 6	M/H - 4	M – 48
Post mitigation	L/M - 2	L/M - 2	L/M - 4	L/M - 2	L - 16

Management and Mitigation measures to address physical soil/land disturbance

- Overburden should be handled more efficiently during operations to avoid erosion when subjected erosional processes.
- Stockpiled topsoil and drill materials should be used to backfill the excavated and disturbed site areas/spots.
- Soils that are not within the intended and targeted footprints of the site should be left undisturbed and soil conservation implemented as far as possible.
- Project vehicles and machinery should stick to access roads provide and or meant for the project operations but not to unnecessarily create further tracks on site by driving everywhere resulting in soil compaction.
- The disturbance of the soil surface in the vicinity of the working sites must be minimised to prevent wind erosion. The footprint of the exploration site area must be kept small as much as possible and existing access road are to be always utilised to avoid off road tracks.
- The project footprint area should not be cleared entirely, and the exploration vehicles and equipment must be placed in such a way that soil disturbance is minimised, and the site should be rehabilitated after each onsite work.
- Utilize the existing road trucks as far as possible to minimize the creation of unnecessary and long-term footprints on the already sensitive desert soils.

7.3.3 Soil and Water Resources Pollution

The proposed exploration activities are associated with a variety of potential pollution sources (i.e., lubricants, fuel and wastewater) that may contaminate/pollute soils and eventually water resources. The anticipated potential source of pollution to water resources from the project activities would be hydrocarbons (oil) from project vehicles, machinery, and equipment as well as potential wastewater/effluent from exploration related activities such as sewage. The spills

(depending on volumes spilled on the soils) from these machinery, vehicles and equipment could infiltrate into the ground and pollute the fractured or faulted aquifers on site. However, it should be noted that the scale and extent/footprint of the activities where potential sources of pollution will be handled is relatively small. There are direct surface water bodies on site therefore the impact on surface water resources would be very little to none. However, the potential impact would be on groundwater bodies (resources).

Pre-mitigation measure implementation, the impact significance is moderate and upon implementation, the significance will be reduced to low. The impact is assessed in **Table 15** below.

Table 15: Assessment of the project impact on soils and water resources (pollution)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: - 3	L/M: - 2	M: - 6	M: - 4	M: – 44
Post mitigation	L/M: - 2	L/M: - 2	M/L: - 4	L/M: - 2	L: - 16

Management and Mitigations measures to manage soil and water pollution

- Spill control preventive measures should be in place on site to management soil contamination, thus preventing and or minimizing the contamination from reaching water resources bodies. Some of the soil control preventive measures that can be implemented include:
    - Identification of oil storage and use locations on site and allocate drip trays and polluted soil removal tools suitable for that specific surface (soil or hard rock cover) on the sites.
    - Maintain equipment and fuel storage tanks to ensure that they are in good condition thus preventing leaks and spills.
    - The oil storage and use locations should be visually inspected for container or tank condition and spills.
    - Maintain a fully provisioned, easily accessed spill kit. Spill kits should be located throughout the active project sites contain the floor dry absorbent material and absorbent booms, pads, mats. These would be suitable for ground surface areas that are covered mainly by hard rocks.
- All project employees should be sensitized about the impacts of soil pollution and advised to follow appropriate fuel delivery and handling procedures.

- The Proponent should develop and prepare countermeasures to contain, clean up, and mitigate the effects of an oil spill. This includes keeping spill response procedures and a well-stocked cache of supplies easily accessible.
- Ensure employees receive basic Spill Prevention, Control, and Countermeasure (SPCC) Plan training and mentor new workers as they get hired.
- Exploration site areas where hydrocarbons will be utilized, the surface should be covered with an impermeable plastic liner (e.g., an HDPE liner), carefully placed to minimize risk of puncturing, to prevent any spillages from getting into direct contact with the soils and prevent eventual infiltration into the ground.
- Project machines and equipment should be equipped with drip trays to contain possible oil spills when operated on site.
- In cases of accidental fuel or oil spills on the soils from site vehicles, machinery and equipment, the polluted soil should be removed immediately and put in a designate waste type container for later disposal as per the preceding bullet point. The removed polluted soil should either be completely disposed of or cleaned and returned to where it was taken from on site or can be replaced with a cleaner soil. This is to ensure that the pollutants contained into the soil does not infiltrate into the site soils and eventually reach to groundwater.
- Although fuel (diesel) required for exploration equipment will be stored in a tank mounted on a mobile trailer, drip trays must be readily available on this trailer and monitored to ensure that accidental fuel spills along the tank trailer path/route around the exploration sites are cleaned on time (soon after the spill has happened).
- Polluted soil must be collected and transported away from the site to an approved and appropriately classified hazardous waste treatment facility.
- Washing of equipment contaminated hydrocarbons, as well as the washing and servicing of vehicles should take place at a dedicated area, where contaminants are prevented from contaminating soil or water resources.
- Toilet water should be treated using one of the following methods:
    - Discharged into chemical toilets and periodically emptied out before reaching capacity and transported to the nearest wastewater treatment facility (an agreement should be reached with the facility owner/operator).

7.3.4 Loss of Biodiversity: Terrestrial Fauna and Flora – General Assessment

A. General Impact Description

Fauna: The movement of project vehicles such as drilling trucks, drilling and excavation activities done onsite to uncover the mineral bearing rock units could result in land degradation, and thus could potentially lead to habitat destruction and loss for a diversity fauna ranging from microorganisms to large animal species. Endemic species would be most severely affected because even the slightest disruption in their habitat can results in extinction or put them at high risk of being wiped out. The movement of heavy project vehicles may also disturb the local wildlife living within the EPL and around the project site. The exploration vehicles and equipment on the explored sites of the EPL would temporarily affect the wildlife due to the operations and presence of both vehicles and humans, resulting in potential relocation of wildlife (moving away) from the EPL site areas during the exploration activities.

Another potential impact of the project activities is the faunal habitat loss and reptiles and small mammals that live under the targeted site vegetation or rock units on the EPL.

The primary impact of invasive exploration activities on fauna is the direct destruction of habitats through land clearing and earthmoving activities. Mobile wildlife species, like game animals, birds, and predators, may leave these areas. More sedentary animals, like invertebrates, many reptiles, burrowing rodents, and small mammals, may be more severely affected.

Flora: This impact is anticipated through the removal of already scarce vegetation that may be found within the project footprints. This would be done to enable mining activities and movement of vehicles. The movement of project vehicles may also destroy the vegetation within project site tracks, especially small shrubs.

All these project activities, if not planned and conducted with care, will potentially lead to the destruction of plant (vegetation) species within the targeted exploration sites within the EPL. Thus, resulting in the loss of such species and eventual loss of biodiversity in the area. The project site area however is already poorly vegetated at some areas, thus minimizing the need to remove vegetation.

Furthermore, the direct impacts on flora and vegetation communities on site will mainly occur through potential dust emissions that may affect surrounding vegetation through the fall of dust. Some loss of vegetation is an inevitable consequence of the proposed activities, however, effort to mitigate the impact will need to be made and the preservation of as much biodiversity prioritized.

B. Ecologist Assessment and Recommendation to mitigate Marine Biodiversity impact

According to Cunnigham (2021), important biodiversity areas – i.e., potential "hotspot" areas – in the EPL 7874 area are (as per **Figure 27**):

i. Halifax Island

This island is protected (Marine Protected Area) and has a global Important Bird Area (IBA) status. The second largest Namibian breeding population of African penguin (endangered) occurs here although their numbers steadily decrease due to various reasons – e.g. fish stocks diminishing; lack of suitable breeding dens; predators; disturbances; pollution, etc. Any further disturbance close to the island may exacerbate the plight of this African penguin population (See white circle in Figure 3).

ii. Rocky Areas – Ridges/Hills/Outcrops

Rocky areas – i.e. ridges/hills/outcrops, etc. – are unique habitat to a variety of important flora (including lichens) and reptiles as well as have suitable sites for dens/refuges for mammals (e.g. brown hyena, various bats, etc.) and birds (e.g. Cape eagle owl) (See black oblongs in Figure 3).

iii. Sandy dune hummocks

Although there are not extensive sandy dune hummocks in the proposed development area, there are patches of vegetated sand, which may serve as potential habitat to the desert rain frog (Breviceps macrops) (See yellow dotted lines in Figure 3).

iv. Patches of unique flora

Unique species – i.e., Red Data, endemic, protected, etc. – are not evenly distributed throughout the area and not always associated with a visible habitat (although could be), but rather small patchy unobtrusive micro-habitats. Such areas are often associated with rocky features and may include patches of Conophytum, Crassula, Lavrania, Lithops and Ruschia species, etc.

Above mentioned areas have not been extensively surveyed by specialists and are at best broad indications of potential important habitats with unique species. Therefore, it is important to identify and confirm unique areas/species, etc. prior to any development activities.

All human induced activities (including exploration) change or are destructive to the local fauna and flora to some or other degree. Assessing potential impacts is occasionally obvious, but more often difficult to predict accurately. Such predictions may change depending on the scope of the activity – i.e., once initiated, may have a different effect on the fauna and flora as originally

predicted. Thus, continued monitoring of such impacts during the exploration phase(s) is imperative.

As indicated by the Ecologist in the Report, the project site and surrounding areas (**Figure 28**) have not been extensively surveyed by specialists and are at best broad indications of potential important habitats with unique species. Therefore, it is important to identify and confirm unique areas/species, etc. prior to any development activities.

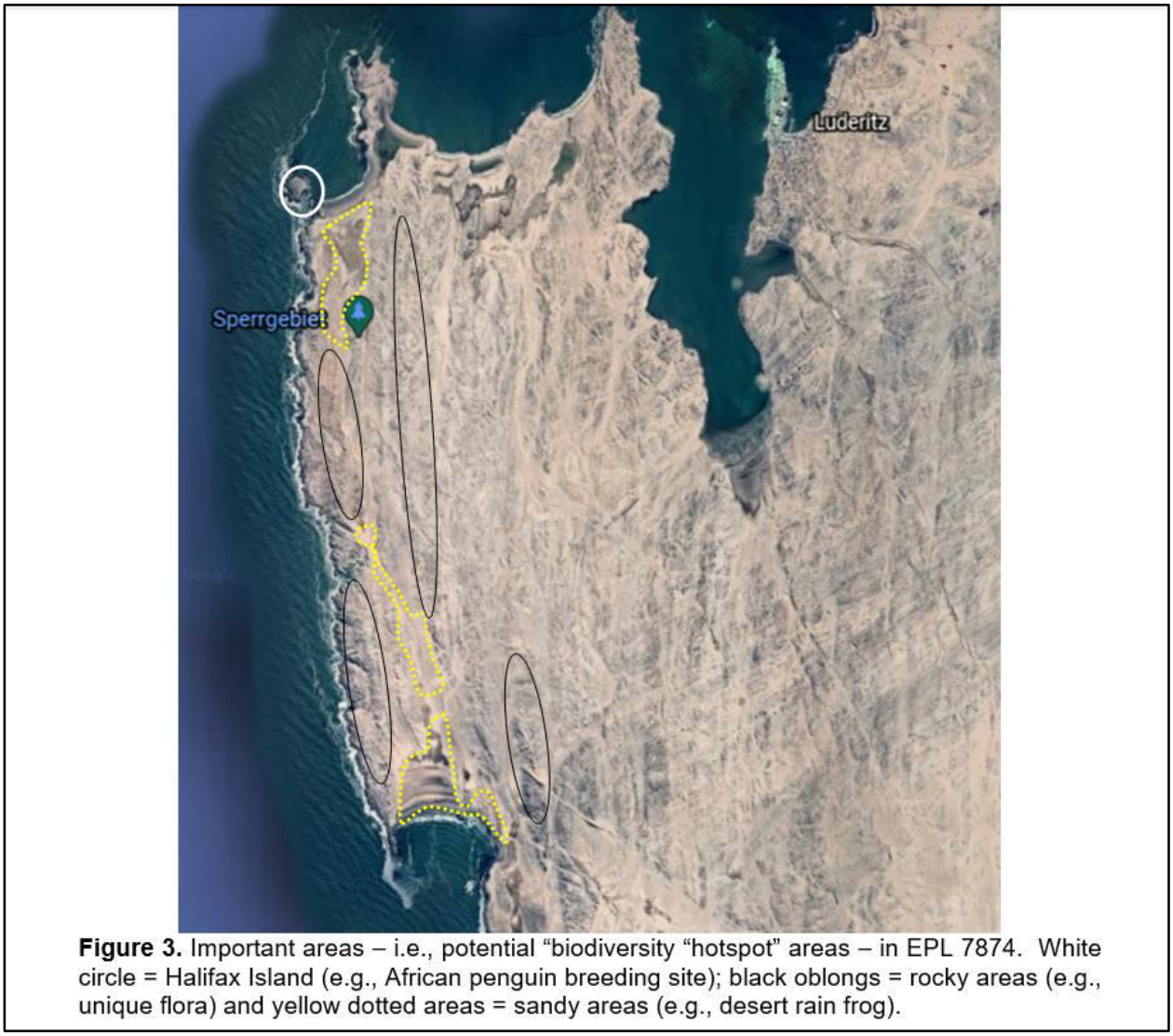


Figure 3. Important areas – i.e., potential "biodiversity "hotspot" areas – in EPL 7874. White circle = Halifax Island (e.g., African penguin breeding site); black oblongs = rocky areas (e.g., unique flora) and yellow dotted areas = sandy areas (e.g., desert rain frog).

Figure 28: The map section showing the EPL with important biodiversity areas within and around the EPL (Cunnigham, 2021)

C. <u>Specialist conclusion:</u>

It is not expected that limited exploration activities throughout the EPL 7874 area will adversely affect any unique vertebrate fauna and flora, especially if the proposed

recommendations (mitigation measures) are incorporated. However, as EPL 7874 spans very important vegetation types with numerous unique species (including vertebrate fauna), it is recommended that fieldwork be conducted to confirm and/or identify patches of unique species to be avoided/removed, etc. before prospecting commences (Cunningham, 2021).

Furthermore, the EPL is locate within proximity to the Namibian Islands Marine Protected Area (NIMPA). If not coordinated and managed properly, exploration activities, particularly the invasive exploration techniques such as drilling could potentially impact the ecology and biology of this protected area. A boundary buffer has been drawn as shown in **Figure 29** indicating the no-crossing zone for exploration activities, i.e., to ensure that the exploration activities remain within the safe zone of the EPL while preserving the NIMPA. However, given the no-go zone maps presented below, it shows that a large area of the EPL (about 60-70%) is ecologically sensitive and only the remaining area can be explored.

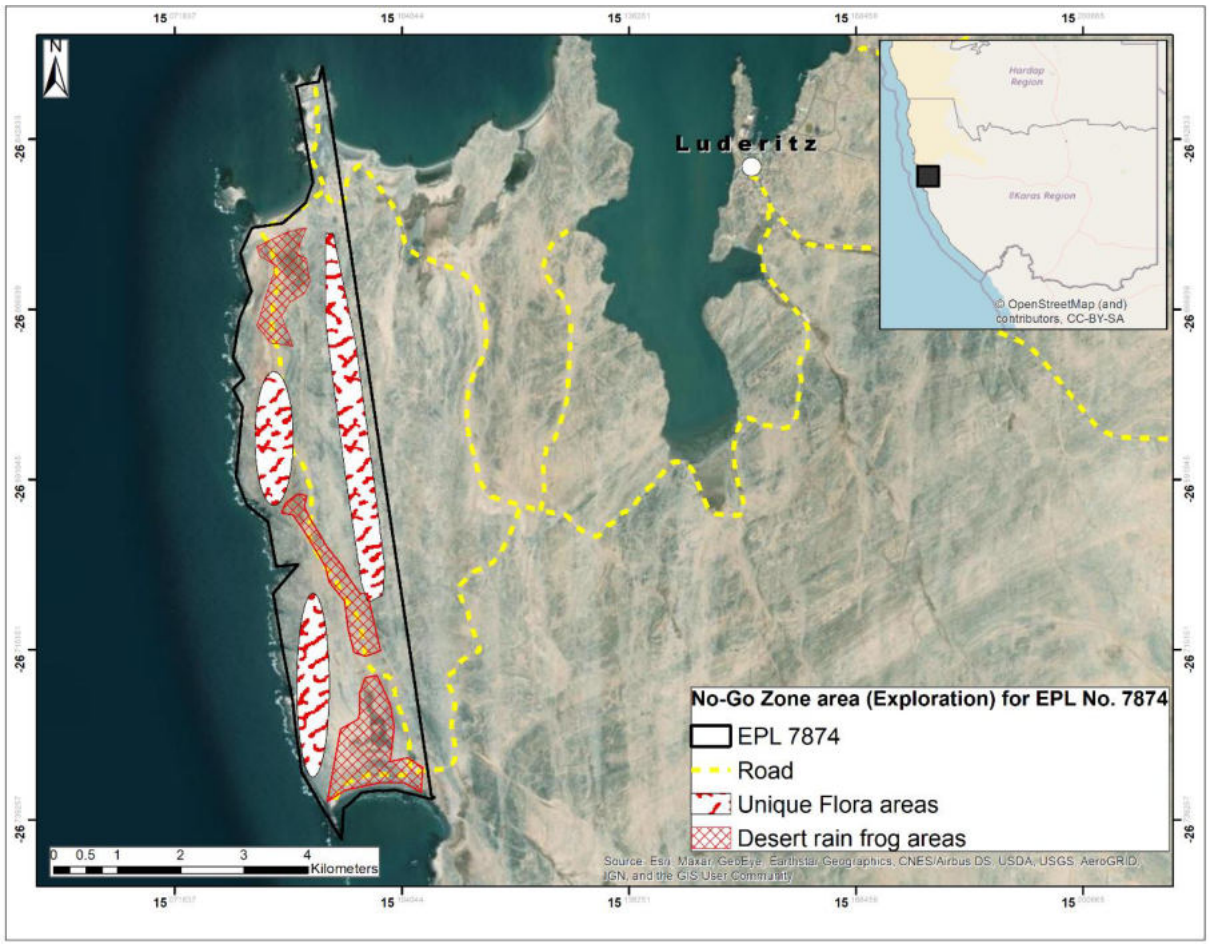


Figure 29: The map section showing the buffer zone around the NIMPA and no-go zone parts of the EPL

Under the status and thorough review of the specialist's input, the combined impact can be rated as medium to slightly high significance. With the implementation of appropriate mitigation measures, the rating will significantly be reduced to medium and with consistent and effective implementation of measures. The impact is assessed in **Table 16** below.

Table 16: Assessment of the impacts of exploration on terrestrial biodiversity (fauna and flora)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: - 3	M: - 3	M: - 6	H: 5	M: – 60
Post mitigation	L/M: - 2	M: - 3	L: - 2	L/M: - 3	L - 21

Management and Mitigations measures to minimize the loss of terrestrial biodiversity (fauna and flora) as recommended by the Ecologist:

Vehicles and Tracks:

- Avoid unnecessary affecting areas viewed as important habitat – i.e., rocky outcrops; lithops/lichen fields; clumps of protected flora species; dune hummocks, etc.
- Make use of existing tracks/roads as much as possible throughout the area.
- Do not drive randomly throughout the area (could cause mortalities to vertebrate fauna and unique flora; erosion related problems, etc.).
- Avoid off-road driving at night as this increase mortalities of nocturnal species.
- Implement and maintain off-road track discipline with maximum speed limits (e.g., 30km/h as this would result in fewer faunal mortalities and limit dust pollution.
- Where tracks must be made to potential exploration sites off the main routes, the routes should be selected in such a way that they cause minimal damage to the environment – e.g., use the same tracks; cross drainage lines at right angles; avoid placing tracks within drainage lines; avoid collateral damage (i.e., select routes that do not require the unnecessary removal of vegetation, especially protected species).
- Rehabilitate all new tracks created as soon as exploration activities are completed.

Campus and Exploration Sites (There will be no exploration camps onsite as the contractors and workers will be accommodated in Lüderitz. Therefore, these recommendations will only be applicable to temporary lay over sites and exploration sites)

- Select camp sites and other temporary lay over sites with care – i.e., avoid important habitats (e.g., lichen fields; dune hummocks, etc.) – or bus people in daily from Lüderitz to avoid potential on-site problems.
- Use portable toilets to avoid fecal pollution around camp and exploration sites.
- Initiate a suitable and appropriate refuse removal policy as littering could result in certain animals becoming accustomed to humans and associated activity and result in typical problem animal scenarios – e.g., black-backed jackal, crows, gulls, etc.
- Avoid and/or limit the use of lights during nocturnal exploration activities as this could influence and/or affect various nocturnal species – e.g., bats and owls, etc. Use focused lighting for least effect.
- Prevent the killing of species viewed as dangerous – e.g., various snakes – when on site.
- Prevent the setting of snares for ungulates (i.e., poaching) or collection of veld foods (e.g., tortoises) and unique plants (e.g., various succulent, *Aloe* and *Lithop* spp.) or anyform of illegal hunting activities.
- Avoid introducing dogs and cats as pets to camp sites as these can cause significant mortalities to local fauna.
- Remove and relocate slow moving vertebrate fauna (e.g., tortoises, chameleon, snakes, etc.) to suitable habitat elsewhere.
- Avoid the removal and/or damaging of protected flora potentially occurring in the general area – e.g., various succulent, *Aloe* and *Lithop* spp., etc.
- Avoid introducing ornamental plants, especially potential invasive alien species, as part of the landscaping of the camp site, etc., but rather use localised indigenous species, should landscaping be attempted, which would also require less maintenance (e.g., water).
- Remove all invasive alien species on site – e.g., *Nicotiana glauca*, etc. This would not only indicate environmental commitment, but actively contribute to a better landscape.
- Inform contractors/workers regarding the above-mentioned issues prior to exploration activities and monitor for compliance thereof throughout.
- Rehabilitate all areas disturbed by the exploration activities – i.e., camp sites, exploration sites, etc.
- Employ an independent environmental auditor to ensure compliance, especially of the rehabilitation of all the affected areas.

7.3.5 Potential Land Use Conflict

There are pre-existing land uses undertaken at the coastal side of the project area. These land uses include fishing activities in and around the Lüderitz area center on white fish (hake), tuna, crayfish as well as oyster farming. Since fishing is only carried out near Lüderitz, which is about 16 km away from the EPL, the impact on the fishing activities is minimal to none. Other activities happening in the area include tourism at destinations such as Museum at Kolmanskop Ghost Town, one concession to Pomona Ghost Town, Bogenfels Rock arch, etc., There are also recreational activities by the local communities as well as travellers along the Lüderitz Peninsula. Recreational activities include bird-watching such as visiting Halifax Island to view Namibia's largest colony of African penguins, exploring the Lüderitz Peninsula and its many bays and beaches, whale watching, windsurfing, and speed-sailing (Travel News Namibia, 2019).

The presence of the proposed exploration activities would bring some sort of conflict in relation to the above-mentioned land uses and activities. It is important to note that for obvious reasons, all the exploration works will be conducted within the recommended areas as indicated in the buffer maps provided by both the Ecologists and Archaeologist. The potential conflict would be temporary given the duration of exploration activities and however only arise if the proposed activities were not undertaken in compliance with the provided management and mitigation measures as well conditions of operations set by the affected authorities.

Based on the assessment description above and in **Table 18** below, the impact is of medium significance, pre-implementation of mitigation measures. However, upon implementation of measures, the significance will be reduced from medium to low.

Table 17: Assessment of exploration activities and land use conflicts

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: - 3	L/M: - 2	M: - 6	M/H: - 4	M: – 44
Post mitigation	L/M: - 2	L/M: - 2	L: - 2	L/M: - 2	L: - 12

Management and Mitigations measures to minimize land use conflict

- The Proponent should only carry out exploration works within the areas marked for such (to exclude high ecologically sensitive areas).
- Exploration activities should not in any hinder the existing land uses within the EPL but rather promote co-existence throughout the operations while respecting other land users.

- The project workers and vehicles should be limited to the actual EPL active sites only but not unnecessarily wander and drive around other land uses sites, respectively.
- The project vehicles and equipment should not be parked at tourist sites nor hinder the movement of tourists while operating near tourist routes within the EPL.
- The Proponent should ensure that their activities comply with the conditions set by the competent, regulatory, and affected authorities such that the proposed exploration activities do not severely impact the different existing activities of the National Park.
- Permits and authorizations that regulate the operations of developments in a national park should be applied for and obtained from the relevant authorities prior to commencement of works on site.

7.3.6 Generation of Dust (Air Quality)

Lüderitz town and surrounding areas experience heavy winds throughout the year. Therefore, dust emanating from site access roads when transporting exploration equipment and supply such as water to and from site (time-to-time) may negatively affect the air quality in the area. Vehicular movements create dust even though it is not always so severe. The loose and sandy nature of the substrate and low vegetation cover causes ambient fugitive dust levels. The air quality would not only be compromised by the dust generated from the movement of vehicles on the roads and drilling, but also the possible emissions of gases from heavy vehicles and machinery. These sources of dust and emissions may lead to air pollution, thus decreasing the air quality in the areas of operations.

Majority of the dust would be generated during the detailed exploration stage, i.e., at the drilling sites, and this could contribute to short-term decrease in air quality around the working site areas of the EPL.

According to Resilient Environmental Solutions (2019), dust generated from operating the geological drill rigs could result in the production of respirable dust (particulate matter smaller than 50 µm or even 10 µm in size), which could impact the respiratory health of the drill rig operators/workers. The dust produced might also settle on nearby vegetation and may affect rates of photosynthesis and transpiration. The settled dust on plant leaves may not only affect the vegetation's functionality but livestock that feed on the vegetation (i.e., browsing) too.

Furthermore, the main respiratory diseases related to inhaled mineral dusts include, pneumoconiosis (which includes silicosis, asbestosis, and coal miner’s pneumoconiosis), and cancer (including bronchogenic carcinoma and malignant mesothelioma). It should be noted

however that the scale and nature of the operation (i.e., drilling for exploration purposes only) is such that prolonged and continuous exposure to mineral dust (as experienced during a full production mining operation) is not expected. Furthermore, the work environment – i.e., open air, is of such a nature that particulate matter is freely dispersed, as opposed to mineral dust generation within a confined space (Resilient Environmental Solutions, 2019).

The dust generated and fumes emissions do not only impact people (health and visual) and fauna but also flora. Mainly for nearby flora, the fallout dust could affect the rates of photosynthesis and transpiration in a long-terms due to the duration of mining activities.

The impact can be rated as medium (significance) if no mitigation measures are implemented. However, once this is done, the impact significance can be reduced to low - please refer to the assessment in **Table 19** below.

Table 18: Assessment of the impacts of exploration on air quality

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: - 3	L/M: - 2	M: - 6	M/H: - 4	M: – 44
Post mitigation	L/M: - 2	L/M: - 2	L: - 2	L/M: - 2	L: - 12

Management and Mitigation measure to minimize dust and gaseous emissions.

- The Proponent should ensure that the exploration schedule is limited to the given number of days of the week, and not every day. This will keep the vehicle-related dust level minimal in the area.
- Since the project site is in an area where due to limited vegetation cover, soils are exposed, it is highly probable that more dust will be generated from exploration activities (excavating). It is, therefore, advised that during extremely windy days, a reasonable amount of water should be used to suppress the dust that may be emanating from certain exploration activities.
- Exploration vehicles should not drive at a speed more than 40 km/h to avoid dust generation around and within the site area.
- The Proponent should ensure that the exploration schedule is limited to the given number of days of the week, and not every day. This will keep the vehicle-related dust level minimal in the area.

- Dust control measures such as reasonable amount of water spray should be used on access roads emitting a lot of dust and near exploration sites to suppress the dust that may be emanating from certain exploration areas on the EPL.
- Dust masks, eye protective glasses and other respiratory personal protective equipment (PPE) such as face masks should be provided to the workers on site drilling areas, where they are exposed to dust.
- Drilling and excavating equipment should be regularly maintained to ensure drilling and excavation efficiency and so to reduce dust generation and harmful gaseous emissions.

7.3.7 Visual Impact and Tourism

Exploration and mining related activities usually have a potential of visually impacting the local sense of place, either through un-rehabilitated worked surface sites areas or the presence of project infrastructure and related services. If the project operations are located close to or along roads or frequented areas, these scars in many cases contrasts the surrounding landscape and thus may potentially become a visual nuisance, especially in tourist-prone areas. The EPL houses the district roads, the D733 and D702 that are used not only by local travelers and coastal holiday makers, but tourists too. The sight of the un-rehabilitated worked/explored areas of the site may be an eyesore to those people.

According to Visual Impact Assessment conducted for the project by Chetty (2021), the visual receptors are grouped according to the similarities in views. The visual receptors included in this study are:

1. **Residents**: static views from buildings that have visual exposure tend to have a relatively wide cone of vision as the viewer tends to scan back and forth across the landscape. Residents and tourists staying within the affected zone of influence are therefore classified as visual receptors of high sensitivity owing to their sustained visual exposure to the proposed development as well as their attentive interest towards their living environment.
2. **Tourists**: tourists would be travelling as motorists and have therefore been included in the motorist receptor categorisation. Tourists are regarded as visual receptors of exceptionally high sensitivity. Their attention is focused on the landscape which they essentially utilise for enjoyment purposes and appreciation of the quality of the landscape. While there may not be any tourist attractions in proximity to the project area, tourists may use the district roads and nearby tourist roads to travel to tourist destinations around the site and surrounding destinations in the //Karas Region at large.

3. **Motorists**: they are generally classified as visual receptors of low sensitivity due to their momentary views and experience of the proposed development. Under normal conditions, views from a moving vehicle are dynamic as the visual relationship between the activity is constantly changing as well as the visual relationship between the activity and the landscape in which they are seen. The view cone for motorists, particularly drivers, is generally narrower than for static viewers. Motorists will therefore show low levels of sensitivity as their attention is focused on the road and their exposure to roadside objects is brief.

Therefore, the visual impact is largely dependent on the sensitivity of the views and related perspective of visual receptors. The weather conditions such as fog, wind in the area also might play a role in reducing the visual impact of the project activities.

Visual impact due to the proposed exploration works is aesthetic damage to the landscape. Excavation, drilling and sampling activities may leave scars on the local landscape. The fact that the EPL lies within the Tsau //Khaeb National Park is very alarming with regards to visual scars. There are important tourist routes within the EPL site, and scars to the landscape would contrast the surrounding landscape and may potentially become a visual nuisance, especially for the tourism industry. The sampled trenches/excavated pits and drilled boreholes would be easily backfilled and closed off; respectively, therefore, the impact stemming from these can be deemed minimal. The short-term impact on the local sight would also be the presence of drilling rigs, trucks, vehicles, ablution facilities (toilet system/washroom), etc. that may be visible to travelers and tourists in an open area such as the Namib Desert, therefore contrasting the local landscape and causing a visual nuisance to neighboring roads users. The impact would be felt during the detailed stage of the project (invasive methods where excavation and drilling vehicles and equipment are onsite, and excavation and drilling are carried out). Currently, the visual impact can be rated as medium high, and can be reduced to medium and then low significance upon effectively implementing the management and mitigation measures.

The assessment of this impact is presented in **Table 20**.

Table 19: Assessment of exploration on visual

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M/H: - 4	M/H: - 4	H: - 5	M/H: - 4	M – 52
Post mitigation	L/M: - 2	M: - 3	L: - 2	L/M: - 3	L - 21

Management and Mitigations measures to minimize visual impact.

- The Proponent should consider the implementation of continuous rehabilitation programme, by using topsoil and overburden waste rocks and restoring and vegetation harmed through the process, to visually maintain the landscape's natural setting.

The Proponent should not create unnecessary routes (access roads), which lead to landscape scarring on site by utilizing existing road trucks as far as possible to minimize the creation of unnecessary and long-term footprints on the already sensitive desert soils.

- The Proponent should carry out progressive working and restoration/rehabilitation over the shortest timescale possible, to avoid excessive areas of disturbance on site.
- Consider setting up drill rigs and associated facilities further from the roads' parts of the EPL to reduce the sight from road users.
- In the case that two or more confirmed targets for detailed exploration are close to the roads, consider working as fast as possible on sites that are closest to the roads to ensure that the presence of trucks, drill rigs and associated structures is shortened.
- Avoid using vehicles, equipment, machinery and even ablution facilities with different contrasting colors so that they do not cause a significant contrast on site (different bright colours present on site).

7.3.8 Vehicular Traffic Safety and Increase in Traffic Flow

The main road B4 is the main transportation route for all vehicular movement around Lüderitz from the southeast (from Kolmanskop). Project associated heavy vehicles will obtain access to the site from the B4 road that connects the EPL activities to the service providers inland (water carting, exploration machinery, equipment, and others).

For exploration, water trucks will be frequenting the area once or twice a week to cart water to exploration sites on the EPL. Project associated light, medium, and heavy vehicles will obtain access to the site via the district roads, D733 and D702 roads that connect the EPL to exploration activities' service providers inland (water carting, exploration machinery, equipment, and others). The roads will also be used to transport the project workers from Lüderitz to site because there will be no campsite erection on site. This would potentially increase slow moving heavy vehicular traffic along the two district roads that are also used not only by local travelers and coastal holiday makers, but tourists too. The impact would not only be felt by these road users but the local road users due to additional pressure on the roads.

The time-to-time transportation of the above-mentioned project resources may increase traffic in the area on certain days of the week or month when required. However, only so many times a week or even monthly that the exploration related heavy trucks will be transporting materials and equipment from and to site, respectively, therefore the risk is anticipated to be short-term, not frequent, and therefore of medium significance.

To reduce the impact significance from the pre-mitigation significance (medium rating) to low rating, the mitigation measures provided below should be implemented. This impact is assessed in **Table 21** below.

Table 20: Assessment of the impacts of the increase in traffic flow

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: - 3	L/M: - 2	M: - 6	M: - 4	M: – 44
Post mitigation	L/M: - 2	L/M: - 2	M/L: - 4	L/M: - 2	L: - 16

Management and Mitigations measures to address increased traffic flow related vehicular traffic issues.

- Vehicles should be driven only on existing access roads and necessary temporary access roads only leading to EPL mapped sites; no new roads should be constructed.
- The transportation of exploration materials, equipment and machinery should be limited to once or twice a week only, but not every day.
- The heavy truck loads should comply with the maximum allowed limit while transporting materials and equipment/machinery on the public and access roads.
- The carted water into the area from outside the project area and Lüderitz should be done once or twice a week in container that can supply and store water for most of the week, thus reducing the number of trucks on the road.
- Drivers of all project phases' vehicles should be in possession of valid and appropriate driving licenses.
- Vehicle drivers should adhere to the road safety rules.
- Drivers should drive slowly (40km/hour or less), and on the lookout for wildlife and people.
- Project vehicles should be in a road worthy condition and serviced regularly to avoid accidents because of mechanical faults of vehicles.
- Vehicle drivers should only make use of designated site access roads provided.

- Vehicle drivers should not be allowed to operate vehicles while under the influence of alcohol.
- Sufficient parking area for all project vehicles should be provided for and clearly demarcated on sites.
- The Proponent should make provision for safe materials and equipment offloading and loading areas on sites.
- No heavy trucks or project related vehicles should be parked outside the project site boundary or demarcated areas for such purpose.
- Truck movements, frequency, times, and routes should be carefully planned and scheduled – please refer to the next point.
- To control traffic movement on site, deliveries from and to site should be carefully scheduled. This should optimally be during weekdays and between the hours of 8am and 5pm.

7.3.9 Disturbance to Archaeological & Heritage Resources

A. <u>Specialist Impact Assessment and Management Measures</u>

During exploration works, historical resources may be impacted through inadvertent destruction or damage. This may include the excavation of subsurface graves or other archaeological objects. The EPL area contains some sites of heritage significance such as the historical sites identified at Diaz Point and Guano Bay. The potential impact of the proposed activities on these heritage sites would be detrimental, and therefore, considered as of medium high significance. Consequently, an Archaeological impact assessment was commissioned for the EPL and undertaken by an independent specialist (Archaeologist) to further assess the potential impact of the proposed activities on the archaeological resources and recommend appropriate management and mitigation measures.

The potential impact was assessed by the specialist and the specialist assessment merged with the criteria used in this ESA study.

B. <u>Specialist Impact Assessment and Management Measures</u>

The area covered by EPL 7874 is well known, archaeologically the area is rich in heritage dating back to the time before the arrival of the Europeans in the late 15th century. According to Kinahan (2000) local hontentots lived near Angra Paquena when Dias arrived there in 1488. However

permanent structures were erected by Dias in 1488 in the form of a cross to mark the point he made a U-turn back to Portugal. Abandoned Old mining buildings from the German and South African period are found within this area and has become a major tourist attraction. However, it was noted during site visit that the tidal bridge linking the mainland and the tidal island headland where Dias erected a cross has been damaged owing to years of neglect. It is not clear as to whether this area fall under the jurisdiction of the Lüderitz municipality or National heritage council. In any case it needs restoration since the bridge has almost disappeared except for the remaining wooden bridge pillars. The rest of EPL 7874 south of Dias point is barren hard rock land. It is likely that granite deposit can be found in the area. The field work yielded no further heritage to the south of Dias Point within this EPL. The locality of the Dias pint is shown in **Figure 29** below.

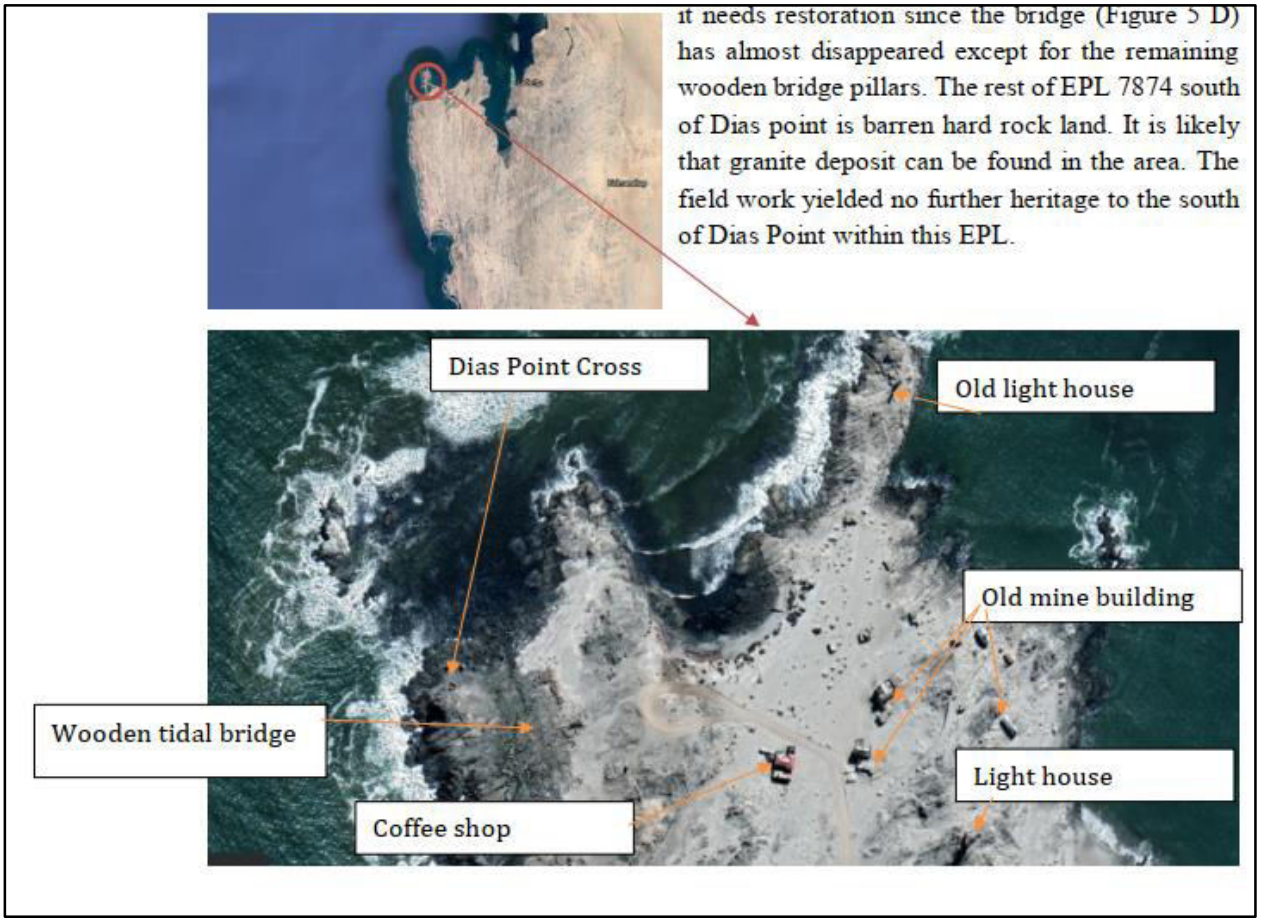


Figure 30: Locality map of Dias point within EPL 7874 (edited after Mowa, 2021)

Upon implementation of the specialist's recommended measures, the impact significance will be reduced from medium high to medium and eventually low. The impact is assessed in **Table 21**.

Table 21: Assessment of the impacts of exploration on archaeological resources

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: - 3	L/M: - 2	M: - 6	M/H: - 4	M: – 44
Post mitigation	L/M: - 2	L/M: - 2	L: - 2	L/M: - 2	L: - 12

Management and Mitigations measures to minimize the impact on archaeological resources

- Project workforce on the site should be made aware that under the National Heritage Act, 2004 (Act No. 27 of 2004) any items protected under the definition of heritage found during development should be reported to the National Heritage Council.
- Graves or any archaeological significant objects discovered on the site during exploration should not be disturbed but are to be reported to the project Environmental officer or National Heritage Council offices.

Specialist's recommendations

- To protect the environmental integrity of the area (Dias Point) from noise and air pollution resulting from mineral exploration we advise the proponent not to undertake exploration within 1 to 2 km from the boundaries of Dias point (**Figure 30**). As highlighted, this is to protect the delicate heritage from losing its integrity and its place as a major tourist attraction owing to being undermined by exploration and mining activities. It is also important to note that the national heritage council have the final decision regarding the permissible range of exploration in reference to the distance from heritage resources identified in this study.
- If the National Heritage council decides to issue the proponent with a consent for an ECC, it is strongly advised that the Proponent adhere to and implement the Chance Find procedures.
- As indicated in the result above, this study relied on surface-based visual observation, which means that there is a possibility that sub-surface archaeological resources might be unearthed during the explorations.
- Should any subsurface heritage resources be present the damage to archaeological resources will be extensive. Therefore, the Proponent is advised to implement the following management actions.
    - **Chance Finds Procedure (CFP) management guideline:**

The EPL is an important mining infrastructure development area subject to heritage & archaeological assessment at the planning stage. These assessments were desktop based, and field surveys were carried out, therefore; significant subsurface heritage resources might be discovered. Onsite personnel and contractors must be sensitized to recognize “chance finds heritage” in the course of their work. The procedure set out here covers the reporting and management of such finds. The CFP covers the actions to be taken from the discovery of a heritage site or object to its investigation and assessment by a trained archaeologist. The CFP is intended to ensure compliance with the relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): “a person who discovers any archaeological objects must as soon as possible report the discovery to the council”.

7.3.10 Waste Generation

During the prospecting and exploration phase, domestic and general waste is produced on site. If the generated waste is not disposed of in a responsible way, land pollution may occur on the EPL or around the sites. The EPL is in an area of moderate sensitivity to pollution. Improper handling, storage and disposal of hydrocarbon products and hazardous materials at the site may lead to soil and groundwater contamination, in case of spills and leakages. Therefore, the exploration programme needs to have appropriate waste management for the site. Without any mitigation measures, the general impact of waste generation has a medium significance. The impact will reduce to low significance, upon implementing the mitigation measures.

The assessment of this impact is given in **Table 23**.

Table 22: Assessment of waste generation impact

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M/H: - 4	M/H: - 4	M: - 6	M: - 3	M: – 42
Post mitigation	L/M: - 2	L: - 1	L: - 2	L/M: - 2	L: - 10

Management and Mitigations measures to address waste

- Both biodegradable and non-biodegradable wastes must be stored in separate containers and collected regularly for disposal at a certified landfill/dump site.

- Litter of any nature should be contained in closed containers, so it does not blow away in strong wind and to remain out of reach of crows, jackals and hyenas.
- Any hazardous waste that may have an impact on the animals, vegetation or the environment should be handled cautiously and disposed of in accordance with hazardous waste management guidelines.
- No refueling of vehicles on site. Refueling should only be done in Lüderitz at a designated refueling facility.
- Workers should be sensitized to dispose of waste in a responsible manner and not to litter.
- After each daily works, the Proponent should ensure that there are no wastes left on the sites.
- All domestic and general operational waste produced daily should be contained until such that time it will be transported to designated waste sites.
- No waste may be buried or burned on site or anywhere else.
- The exploration site should be equipped with separate waste bins for hazardous and general waste/domestic.
- Sewage waste should be stored as per the portable chemical toilets supplied on site and regularly disposed of at the nearest treatment facility.
- Oil spills should be taken care of by removing and treating soils affected by the spill.
- A penalty system for irresponsible disposal of waste on site and anywhere in the area should be implemented.
- Careful storage and handling of hydrocarbons on site is essential.
- Potential contaminants such as hydrocarbons and wastewater should be contained on site and disposed of in accordance with municipal wastewater discharge standards so that they do not contaminate surrounding soils and eventually groundwater.
- An emergency plan should be available for major/minor spills at the site during operation activities (with consideration of air, groundwater, soil and surface water) and during the transportation of the products(s) to the sites.
- After each daily works, there should not be waste left scattered on site, but rather be disposed of in allocated site waste containers.
- No waste may be buried or burned on site or anywhere else throughout the project lifecycle.
- All domestic and general waste produced daily should be contained until such that time it will be transported to designated waste sites on a weekly basis.

- The sites should be equipped with separate waste bins for hazardous and general waste/domestic.
- Hazardous waste, including emptied chemical containers should be safely stored on site where they cannot be accessed and used by uniformed locals for personal use. These containers can then be transported to the nearby approved hazardous waste sites for safe disposal. No waste should be improperly disposed of on site or in the surroundings, i.e., unapproved waste sites.
- As an emphasis on the preceding point, empty hazardous substance containers should not be disposed of anywhere on the project site or its surrounding, but instead they should be kept at a designated storing place on site until such time that they can be safely taken to the nearest approved hazardous waste sites.
- A penalty system for irresponsible disposal of waste on site and anywhere in the area should be implemented.

7.3.11 Occupational Health and Safety Risks

Project personnel (workers) involved in the exploration activities may be exposed to health and safety risks. These are in terms of accidental injury, owing to either minor (i.e., superficial physical injury) or major (i.e., involving heavy machinery or vehicles) accidents. The site safety of all personnel will be the Proponent's responsibility and should be adhered to as per the requirements of the Labour Act (No. 11 of 2007) and the Public Health Act (No. 36 of 1919). The heavy vehicle, equipment and fuel storage area should be properly secured to prevent any harm or injury to the Proponent's personnel or local domestic animals.

The use of heavy equipment, especially during drilling and the presence of hydrocarbons on sites may result in accidental fire outbreaks. This could pose a safety risk to the project personnel and equipment and vehicles too.

Another potential health risk stemming from the proposed project is the mishandling and disposal of hazardous waste on site may pose a risk to project workers and local wildlife that may wander near the project sites in the EPL.

The impact is probable and has a medium significance rating. However, with adequate mitigation measures, the impact rating will be reduced to low. This impact is assessed in **Table 24** below and mitigation measures provided.

Table 23: Assessment of the impacts of exploration on health and safety

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	M/H - 4	M - 6	M/H - 4	M – 48
Post mitigation	L/M - 2	L/M - 2	L/M - 4	L/M - 2	L - 16

Management and Mitigations measures to address health and safety issues

- Workers should be tested before-hand for high fever prior to commencement of exploration.
- As part of their induction, the workers should be provided with an awareness training of the risks of mishandling equipment and materials on site.
- When working on site, employees should be properly equipped with personal protective equipment (PPE) such as coveralls, masks, gloves, safety boots, earplugs, safety glasses and hard hats.
- No employee should be allowed to consume alcohol or other intoxicants prior to and during working hours as this may lead to mishandling of equipment which results into injuries and other health and safety risks.
- Employees should not be allowed on site if under the influence of alcohol or any intoxicants.

7.3.12 Noise and Vibrations

The excavation and drilling activities as well as the movement of heavy vehicles associated with exploration on site may lead to increase noise level which can be a nuisance to travelers on the nearby roads, surrounding land users and local wildlife (frightened and forced to move away from noisy areas). Overexposure to high noise levels would be a concern and pose health risk to site workers who are operating and working close to equipment and machinery that produce high noise level. However, the impact of noise on people would also depend on the sound levels (high enough to be potential sources of worker overexposure), duration and time of exposure.

The group of potential high noise-level exposed workers would be drillers, and excavators.

Excavations and drilling will be limited to a certain extent, exploration, activities and within site boundaries only. The activities will be limited to working hours of the day only and five days in a week. With that said, noise level will be limited to the active worked sites only for the duration of the works on these sites (10 months), and therefore, the impact likelihood is minimal.

Without any mitigation, the impact is rated as of medium significance. To change the impact significance from the pre-mitigation significance to low rating, the mitigation measures should be implemented. This impact is assessed in **Table 24** below.

Table 24: Assessment of the impacts of noise and vibration from exploration

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M: - 3	L/M: - 2	M: - 6	M: - 4	M: – 44
Post mitigation	L/M: - 2	L/M: - 2	M/L: - 4	L/M: - 2	L: - 16

Management and Mitigations measures to address potential noise and vibration issue

- The transportation of exploration materials, equipment and machinery should be limited to once or twice a week only, but not every day.
- Noise from project vehicles and equipment operations' vehicles and equipment on the working sites of the EPL should be at acceptable levels.
- The exploration times should be set such that, no such activities are carried out during the night or very early in the mornings (to be limited between 8am and 5pm on weekdays).
- Exploration hours should be restricted to between 08h00 and 17h00 to avoid noise and vibrations generated by exploration activities such as drilling and the movement of vehicles before or after hours.
- When operating the excavation and drilling machinery or close to noise-producing equipment and machinery onsite, workers should be equipped with personal protective equipment (PPE) such as earplugs to reduce noise exposure. These PPE should be regularly checked/tested for effectiveness and on detected malfunction, the PPE should be replaced as soon as possible.
- When operating the drilling machinery onsite, workers should be equipped with personal protective equipment (PPE) such as earplugs to reduce exposure to noise.

7.4 Decommissioning and Rehabilitation of Explored sites

Successful rehabilitation requires careful consideration of the local ecological context in combination with rehabilitation goals. The most important steps in undertaking a successful rehabilitation are planning and environmental awareness (environmental education) on the importance of progressive rehabilitation (or post-activity rehabilitation) and its importance to the environment. Furthermore, to successfully implement the planned rehabilitation, practically, this

will depend on a few factors, namely the rehabilitation program, characteristics of the site, nature of disturbance, rehabilitation methods, as well as resources availability.

Rehabilitation of the exploration sites may include the revegetation of bare areas with species consistent with surrounding vegetation; refilling of trenches in such a way that subsoil is replaced first, and topsoil replaces last.

Any exploration drilling holes should not only be filled with sand alone, as wind will scour the sand and re-establish the holes. Necessary landscaping of exploration areas will be undertaken upon completion of each stage of exploration (drilling, sampling, etc.).

7.4.1 Site Specific Rehabilitation Plan

To ensure that they do their best to rehabilitate the disturbed or explored-out site areas, the Proponent intends to:

- Utilize stockpiled subsoil and topsoil to back fill the excavated pits/trenches.
- Make financial provision that will be used for post-exploration rehabilitation program.
- Backfilling of all exploration pits, test quarries, and boreholes that will no longer be required for the exploration works upon completion of such sites to avoid risks such as injuries to both humans and local animals.
- Levelling of topsoil that was stockpiled for exploration purposes upon completion of site works.
- Removal of project vehicles and equipment from the site and taken to designated parking facility off site.
- All project support structures such as ablution facility (toilet and washroom system), and storage containers/tanks shall be demolished, and the waste taken to designated sites. The site areas on which these structures were set up will be rehabilitated to pre-exploration state.
- All accumulated waste (hazardous, solid, and general) up until the cessation of exploration activities will be removed site and transported to designated off site waste management facilities.
- All drill chips/materials that will not be required for further exploration analysis will be used to backfill the boreholes.

7.5 Cumulative Impacts Associated with Proposed Exploration

According to the International Finance Corporation (2013), cumulative impacts are defined as "those that result from the successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to in this document as "developments") when added to other existing, planned, and/or reasonably anticipated future ones".

Similarly, to many other exploration projects, one cumulative impact to which the proposed project and associated activities potentially contribute is the impact on road infrastructure. The proposed exploration activity contributes cumulatively to various activities such as commuting of project personnel to and from site throughout the two stages of exploration (mainly during detailed exploration), farming, fishing activities as well as travelling associated with tourism. The contribution of the proposed project to this cumulative impact is however not considered significant given the scale, duration, and extent of the intended mineral exploration activities. Another cumulative impact to which the project will contribute will be the use of water. While the contribution of this project will not be significant, mitigation measures to reduce water consumption during exploration are essential therefore will be of high priority.

8 RECOMMENDATIONS AND CONCLUSIONS

8.1 Recommendations

The key potential impacts associated with the proposed exploration program and its associated activities on EPL were identified and assessed. It is found that most of the identified potential negative impacts are rated as medium significant and few of a medium high significance. Therefore, to reduce the project impact' significance from their pre-management/mitigation significance to a lower significance, it is recommended that the Proponent effectively implements the recommended management and mitigation measures. Not only to implement the measures but also ensure continuous monitoring of the implementation and performance, to maintain an overall low significance. The negative impacts identified in this study can be avoided and minimised (where impacts cannot be avoided) by implementing the mitigation measures given under section 7 of this EA report, as well as those provided in the management action and monitoring plans provided in the Draft EMP.

A public consultation meeting in a form of two-slot interaction session was held with the public, specifically some of the affected and concerned community members on the 25th of February 2021 at Turnhalle in Lüderitz. The interested and affected parties raised their concerns, and submitted comments on the proposed project activities, and these were noted down during the meetings and follow-up email communications. The concerns and comments received from the public and the local community members formed the basis for this Report and development of the Draft EMP.

Two specialists' studies were conducted for this ESA to assist the Environmental Assessment Practitioner (EAP) in describing the respective baseline environments, assessing the impact, and recommending suitable management and mitigation measures. The two specialists' studies were for:

- **Archaeology** with the conclusion that the study relied on surface-based visual observation, which means that there is a possibility that sub-surface archaeological resources might be unearthed during the explorations. Thus, should any subsurface heritage resources be present the damage to archaeological resources will be extensive. Therefore, the Proponent is advised to implement the Chance Finds Procedure (CFP) management guideline: The EPL is an important mining infrastructure development area subject to heritage & archaeological assessment at the planning stage. These assessments were desktop based, and field surveys were carried out, therefore; significant subsurface heritage resources might be discovered. Onsite personnel and

contractors must be sensitized to recognize "chance finds heritage" in the course of their work. The procedure set out here covers the reporting and management of such finds. The CFP covers the actions to be taken from the discovery of a heritage site or object to its investigation and assessment by a trained archaeologist. The CFP is intended to ensure compliance with the relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): "a person who discovers any archaeological objects must as soon as possible report the discovery to the council".

- **Ecology** (Vertebrate Fauna and Flora Expected to Occur in the EPL 7874) with the conclusion that it is not expected that limited exploration activities throughout the EPL 7874 area will adversely affect any unique vertebrate fauna and flora, especially if the proposed recommendations (mitigation measures) are incorporated. However, as EPL 7874 spans very important vegetation types with numerous unique species (including vertebrate fauna), it is recommended that fieldwork be conducted to confirm and/or identify patches of unique species to be avoided/removed, etc. before prospecting commences.

It is therefore recommended that an Environmental Clearance Certificate be issued for the proposed exploration on EPL 7874, subject to the following recommendations:

- All management and mitigation measures recommended by the specialists (for the sensitive environmental components) are effectively implemented and monitored accordingly.
- All management and mitigation measures provided in this Report (in addition to specialists' specific recommendations) and the management action plans in the draft EMP should be implemented and monitoring conducted as recommended.
- All required permits, licenses and approvals for the proposed activities should be obtained as required (please refer to the Permitting and Licensing Table in the Environmental Management Plan (Appendix B). These include permits and licenses for land access and permission to perform exploration activities in the park as per the Tsau //Khaeb National Park Management Plan of 2012-2018, prohibited/no-go areas on the Peninsula and other sensitive areas marked inside the EPL boundaries (**Figure 29** above) as well as ensuring compliance with all these specific legal requirements.
- The Proponent should comply with the operational rules and regulations of the Tsau //Khaeb National Park (The Park's EMP of 2013-2018) throughout the duration of the prospecting and exploration works.

- All the necessary environmental and social (occupational health and safety) precautions provided should be adhered to.
- Site areas where exploration activities such as excavated pits and drilled boreholes have ceased should be rehabilitated, as far as practicable, to their original state.
- The monitoring of the implementation of management and mitigation measures should be conducted, applicable impact's actions taken, reporting done and recorded as recommended in the Draft EMP.

8.2 Conclusion

The potential positive and negative impacts stemming from the proposed exploration activities were identified, assessed and mitigation measures made thereof. The management and mitigation measures recommended in this report and as provided in the draft EMP, can be deemed sufficient to avoid and/or reduce (where impact avoidance impossible) the risks to acceptable levels.

Excel Dynamic Solutions (Pty) Ltd is, therefore, confident that the anticipated potential negative impacts stemming from the exploration activities, specifically the detailed exploration (invasive methods) will be of short-term duration and the effective implementation of management and mitigation measures provided thereto are sufficient. And thus, EDS recommends that an Environmental Clearance Certificate (ECC) may be issued to the Proponent to enable the prospecting and exploration works on the EPL. To ensure that the Proponent approaches the project with caution and abides to the effective implementation and monitoring of management and mitigation measures provided to each potential impact. Monitoring of the environmental components described in the impact assessment should be conducted by the Proponent and applicable Competent and Affected Authorities such as the Ministry of Environment, Forestry and Tourism (Parks Division), Ministry of Mines and Energy (MME) as well as Ministry of Fisheries and Marine Resources (MFMR). This will be done to ensure that all potential impacts identified herein and these that might arise during project activities' implementation are well identified in time and properly addressed. Lastly, should the ECC be issued, the Proponent will be obliged to comply with the ECC conditions, other conditions set by other governmental institutions such as MME and other legal requirements governing the mineral prospecting and exploration and related activities

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VERTEBRATE FAUNA AND FLORA EXPECTED TO OCCUR IN THE EPL 7874, LÜDERITZ AREA
[Desktop Study – Baseline/Scoping]

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CONTENTS

Vertebrate fauna and flora expected to occur in the EPL 7874, Lüderitz area

1 Introduction

A comprehensive literature study (desktop) of the vertebrate fauna (i.e. amphibians, birds, mammals and reptiles) and flora (i.e. larger trees/shrubs [>1m in height], including other flora and grasses) expected to occur in the general Lüderitz area was conducted between 12 and 15 February 2021. This area covers and includes EPL 7874 located to the west of Lüderitz on the Lüderitz Peninsula (See Figures 1 and 2).

The literature review was to determine the actual as well as potential vertebrate fauna and flora associated with the general area west of Lüderitz – i.e. Lüderitz Peninsula area – commonly referred to as the Desert and Succulent Steppe (Giess 1971) or the Succulent Karoo – Succulent Steppe (Mendelsohn *et al.* 2002) (Figure 1). The Succulent Karoo has been identified as one of 25 'biodiversity hotspots' in the world and of extreme high conservation value (Burke 2003). The Namib – of which the Desert and Succulent Steppe forms part of – is relatively well represented in the protected area network in Namibia covering 32% of the land area and 29.7% of the biome (Barnard 1998). Most of this biome currently falls within the Sperrgebiet National Park (recently changed to the Tsau//Khaeb National Park, although Sperrgebied is used throughout this report as it is better known) which used to be known as Diamond Area No 1 and part of the Namib-Naukluft National Park (south-western portion) in the past.

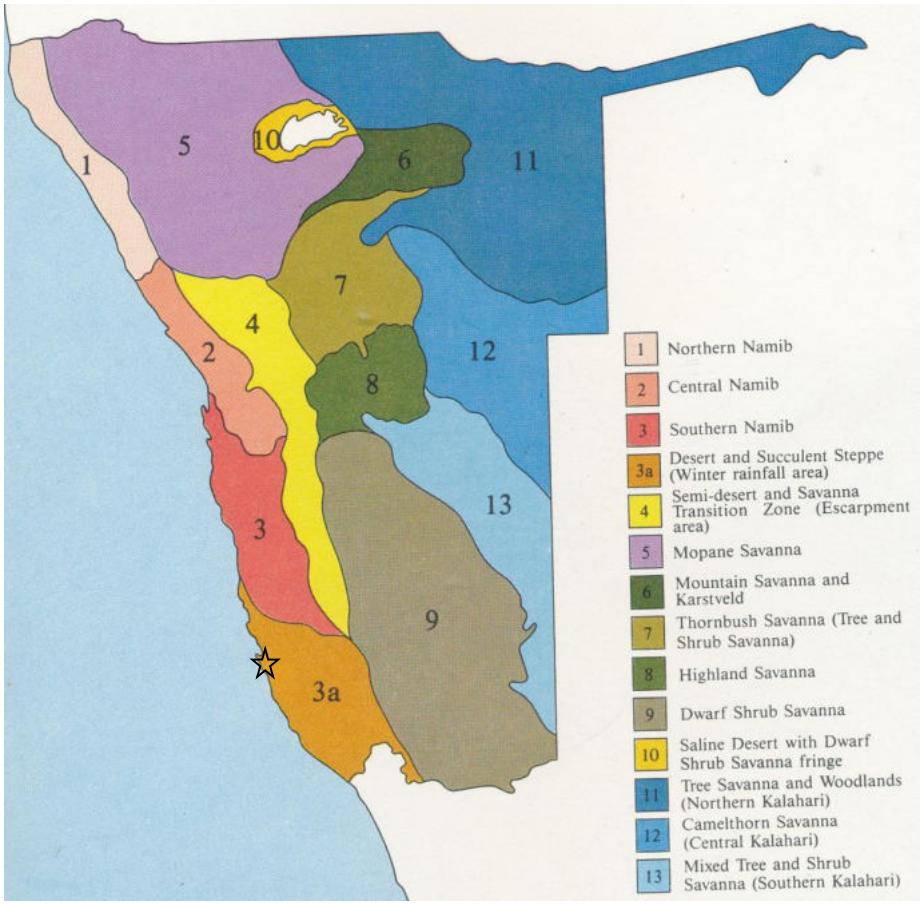

Figure 1. The EPL 7874 falls within the Desert and Succulent Steppe vegetation type – See black star (Giess 1971).

Figure 2. EPL 7874 located to the west of Lüderitz on the Lüderitz Peninsula between Grosse Bucht and Diaz Point (Source: Excel Dynamic Solutions).

Vertebrate fauna
The general area is regarded as "low" in overall (all terrestrial species) diversity (Mendelsohn *et al.* 2002) while the overall terrestrial endemism in the area on the other hand is viewed as "average" (Mendelsohn *et al.* 2002). The overall diversity and abundance of large herbivorous mammals (big game) is viewed as "low" with 1-2 species while the overall diversity of large carnivorous mammals (large predators) is determined at 4 species with brown hyena being the most important with "medium" densities expected in the area (Mendelsohn *et al.* 2002).

It is estimated that at least 32 reptile, 4 amphibian, 30 mammal and 97 bird species (breeding residents) are known to or expected to occur in the general/immediate area of which a high proportion – especially reptiles (56.3%) – are endemics.

Flora
According to Maggs (1998) there are approximately 4344 higher plant species with the most species being within the grasses (422), composites (Asteraceae) (385), legumes (Fabaceae) (377) and fygies (Mesembryanthemaceae) (177), recorded from Namibia. Total species richness depends on further collecting and taxonomic revisions. High species richness is found in the Okavango, Otavi/Karsveld, Kaokoveld, southern Namib and Central Highland (Windhoek Mountains) areas. Endemic species – approximately 687 species in total – are manly associated with the Kaokoveld (northwestern) and the succulent Karoo (southwestern) Namibia. The major threats to the floral diversity in Namibia are:

1). Conversion of the land to agriculture (with associated problems) and,
2). poorly considered development (Maggs 1998, Mendelsohn *et al.* 2002).

The vegetation in the Succulent Karoo Biome which is associated with some winter rainfall and fog, has an astounding richness in plants – mostly low perennial shrubs (chamaephytes) – that have succulent leaves, branches and stems and are found extensively throughout the families Aizoaceae, Crassulaceae, Liliaceae and Euphorbiaceae and have many endemics

as well as endangered or rare species (Lovegrove 1999). The dominant shrub throughout this biome is the pioneer species *Galenia africana* that colonises overgrazed and disturbed areas while the annuals are mostly represented by the family Asteraceae (Lovegrove 1999). This great diversity of plants makes it the most important botanical area in Namibia (Mendelsohn *et al.* 2002, Robertson *et al.* 2012).

The average plant production is extremely low with 0-5% variation in green vegetation biomass (Mendelsohn *et al.* 2002). The overall plant diversity (all species - "higher" plants) in the general area is estimated at less than 50 species in suitable/unique habitats. Plant endemism is relatively "high" with more than 26-35 species expected from the general area (Mendelsohn *et al.* 2002). Simmons (1998b) puts the plant endemism at between 41 to 50 species depending on the locality while Maggs (1998) estimates 180 species being endemic and almost 200 being near-endemic. Burke (2003) estimates that over 5,000 species of plants occur in the Succulent Karoo Biome and at least 660 species in the northern regions of the Sperrgebied with the biggest threats to the botany in this area being mining and illegal collection – e.g. most populations of the 'halfmens' (*Pachypodium namaquanum*) have been eradicated by unscrupulous collectors. Furthermore, very little is also known regarding many other species favoured by collectors – e.g. *Lithops* and *Conophytum*. Succulents are increasingly in danger due to various developments in southern Africa (Smith and Crouch 2009). The Tsau//Khaeb National Park (within which the EPL 7874 occurs) – most of which is pristine area – has more than 1,000 plant species comprising approximately 25% of the entire Namibian flora with numerous endemic and near-endemic species (Mannheimer *et al.* 2008). However, plant diversity decreases away from the species rich Lüderitz Peninsula (Burke 2006). Furthermore, Mendelsohn *et al.* (2002) views the grazing and browse as "very low" in the general area with the risk of farming viewed as "high" and the tourism potential of this area viewed as "average".

The EPL 7874 falls within the Lüderitz Peninsula dwarf-shrubland and the Rocky Coast dwarf-shrubland, both with a with a "very high" conservation importance (Burke 2006).

Lüderitz Peninsula dwarf-shrubland
The extent of this vegetation type is 93.2km² or 0.43% of the Sperrgebied and one of the most diverse areas floristically with up to 330 species recorded (within the quarter-degree square associated with this mapping unit). Leaf-succulent dwarf shrubs and evergreen shrubs are the most prominent plant growth forms in the Lüderitz Peninsula dwarf-shrubland with the vegetation mostly <30cm in height due to being suppressed by the constant strong winds. The vegetation is very diverse and mainly associated with rocky substrate with the key species being *Brownanthus marlothii* and *Lebeckia multiflora*. There is a large number of protected species, many with restricted range and high economic potential for the horticultural trade. These include *Conophytum*, *Crassula*, *Lavrania*, *Lithops* and *Ruschia* species. Endemics – minimum of 40 species – and lichens (high diversity) on the peninsula indicate the importance of this area floristically. The recovery potential is vied as "low" and threats include off-road driving; illegal plant collecting; invasive alien plants; infrastructure developments and quarrying (Burke 2006).

Rocky Coast dwarf-shrubland
The extent of this vegetation type is 46.8km² or 0.22% of the Sperrgebied with at least 60 plant species recorded (within the quarter-degree square associated with this mapping unit). Dwarf shrubs dominate the vegetation, although sparsely scattered on rocky ridges and plains, barely reaching 1% cover while the drainage lines in this area provide a more favourable habitat and can reach up to 10% cover. Most plants are <30cm in height throughout this vegetation type with the coastal outcrops the most important areas floristically with many protected species which include *Amphibolia*, *Cephalophyllum*, *Conophytum*, *Crassula*, *Eberlanzia*, *Fennestraria*, *Juttadinteria*, *Lithops* and *Psammophora* species. Endemic species include *Brownanthus namibensis*, *Ectadium latifolium*, *Eremothamnus*

marlothianus, *Juttadinteria deserticola*, *Limonium dyeri* and *Marlothiella gummifera*. The recovery potential is viewed as "low" and threats include mining and quarrying (Burke 2006).

Larger trees, shrubs and grasses are however limited in the Lűderitz area which is dominated by succulents and an estimated 21 species of larger "key" (i.e. most important) tree and shrub species (mainly succulent shrubs) and up to 18 grasses are known to or expected to occur in the general Lüderitz area.

No communal and freehold conservancies are located in the immediate Lüderitz area with the closest conservancies being the !Han/Awab communal conservancy in the Bethanie area (NACSO 2010) and the Tiras Mountain Commercial Conservancy in the Tiras Mountains area between Aus and Helmeringhausen (See www.canam.iway.na).

2 Methods

2.1 Literature Review

A comprehensive and intensive literature review (i.e. desktop study) regarding the vertebrate fauna (reptiles, amphibians, mammals and birds) and flora (larger trees and shrubs [>1m in height] and grasses) that could potentially occur in the general/immediate Lüderitz area (i.e. the general EPL 7874 area) was conducted between 12 and 15 February 2021 using as many references as manageable. A list of the references consulted can be viewed in the Reference section (Page 25).

3 Results

3.1 Reptile Diversity

Reptile diversity known and/or expected to occur in the general EPL 7874 area (literature study only) is presented in Table 1.

Approximately 261 species of reptiles are known or expected to occur in Namibia thus supporting approximately 30% of the continents species diversity (Griffin 1998a). At least 22% or 55 species of Namibian lizards are classified as endemic. The occurrence of reptiles of "conservation concern" includes about 67% of Namibian reptiles (Griffin 1998a).

Emergency grazing and large scale mineral extraction in critical habitats are some of the biggest problems facing reptiles in Namibia (Griffin 1998a). The overall reptile diversity and endemism in the general area is estimated at between 31-40 species and 9-12 species, respectively (Mendelsohn *et al.* 2002). Griffin (1998a) presents figures of between 11-20 and 3-4 for endemic lizards and snakes, respectively, from the general area. The neighbouring Namib-Naukluft Park has an estimated 100 reptiles present while the Diamond Coast (now Tsau//Khaeb National Park) has an estimated 38 reptiles (Griffin 1998a).

At least 32 species of reptiles are expected to occur in the general area with 18 species being endemic – i.e. 56.3% endemic. The 100 % endemic Nama padloper (*Chersobius (Homopus) solus*) is classified as vulnerable (IUCN 2020) and although very little is known about this species (See Cunningham and Simang 2007), occurs in the Kowisberge area to the east of Lüderitz, but included in Table 1 as it may well occur in the Lüderitz Peninsula area, albeit not yet confirmed from the area. The SARDB (SARDB 2014) classifies 1 species as critically endangered (*Pachydactylus rangei*) although they are more common in Namibia than South Africa and 3 species as near endemic. *Meroles micropholidotus* is also classified as insufficiently known and possibly rare in Namibia (Griffin 2003). Three species are included as CITES Appendix 2 species. The IUCN (2020) furthermore classifies 13 species

Table 1. Reptile diversity known and/or expected to occur in the general EPL 7874 – i.e. southwestern Namibia – area.

Species: Scientific name	Species: Common name	Namibian conservation and legal status	International Status		
			SARDB	IUCN	CITES
TURTLES AND TERRAPINS					
Chersina angulata	Angulate Tortoise	Peripheral; Protected Game	NE		C2
Chersobius (Homopus) solus	Nama Padloper	Endemic; Indeterminate; Protected Game		V	C2
SNAKES					
Blind Snakes					
Rhinotyphlops schinzi	Schinz's Beaked Blind Snake	Endemic; Secure			
Typical Snakes					
Boaedon capensis (Lamprophis fuliginosus)	Brown House Snake	Secure			
Prosymna frontalis	South-western Shovel-snout	Endemic; Secure			
Dipsina multimaculata	Dwarf Beaked Snake	Endemic; Secure			
Psammophis notostictus	Karoo Sand Snake	Secure			
Psammophis namibensis	Namib Sand Snake	Secure			
Naya nivea	Cape Cobra	Endemic; Secure			
Bitis caudalis	Horned Adder	Secure			
Bitis cornuta	Many-horned Adder	Secure			
Bitis peringueyi	Peringuey's Adder	Endemic; Secure		LC	
LIZARDS					
Skinks					
Acontias lineatus lineatus	Striped Legless Skink	Secure		LC	
Typhlosaurus meyeri	Meyers's Blind Legless Skink	Endemic; Secure		LC	
Trachylepis occidentalis	Western Three-striped Skink	Secure			
Trachylepis sulcata nigra	Western Rock Skink	Secure			
Trachylepis variegata variegata	Variegated Skink	Secure			
Old World Lizards					
Meroles anchietae	Shovel-snouted Lizard	Secure		LC	
Meroles cuneirostris	Wedge-snouted Desert Lizard	Endemic; Secure			
Meroles micropholidotus	Small-scaled Desert Lizard	Endemic; Insufficiently known; Rare?		LC	
Meroles suborbitalis	Spotted Desert Lizard	Endemic; Secure		LC	
Pedioplanis namaquensis	Namaqua Sand Lizard	Secure			
Pedioplanis iornata	Plain Sand Lizard	Endemic			
Girdled Lizards					
Karusasaurus (Cordylus) polyzonous	Karoo Girdled Lizard	Endemic	NE		

Agama					
Agama atra knobelli	Southern Rock Agama	Endemic; Secure	NE	LC	
Chameleons					
Chamaeleo namaquensis	Namaqua Chameleon	Secure		LC	C2
Geckos					
Chondrodactylus angulifer angulifer	Giant Ground Gecko	Endemic; Secure		LC	
Chondrodactylus (Pachydactylus) turneri	Turner's Thick-toed Gecko	Secure			
Pachydactylus rugosus rugosus	Rough Thick-toed Gecko	Endemic; Secure		LC	
Pachydactylus (Palmatogecko) rangei	Web-footed Gecko	Endemic; Secure	CE	LC	
Ptenopus garrulus maculatus	Common Barking Gecko	Endemic; Secure		LC	
Ptenopus kochi	Kock's Barking Gecko	Endemic; Secure		LC	

Namibian conservation and legal status according to the Nature Conservation Ordinance No 4 of 1975 (Griffin 2003)
Endemic – includes Southern African Status (Branch 1998)
SARDB (2014): CE – Critically Endangered; NE – Near Endemic
IUCN (2020): V – Vulnerable; LC – Least Concern [All other species not yet assessed]
CITES: CITES Appendix 2 species

Source for literature review: Alexander and Marais (2007), Bates *et al.* (2014), Branch (1998), Branch (2008), Boycott and Bourquin 2000, Broadley (1983), Buys and Buys (1983), Cunningham (2006), Griffin (2003), Hebbard (n.d.), IUCN (2020), Marais (1992), Tolley and Burger (2007)

as least concern while all the other species have not yet been formally assessed by the IUCN Red List (See Table 1). The 32 species expected to occur in the general area consist of at least 10 snakes (1 blind snake and 9 typical snakes) of which 5 species (50%) are endemic; 13 lizards (5 skinks, 6 old world lizards, 1 girdled lizard and 1 agama) of which 7 species (53.9%) are endemic; 6 geckos of which 5 are endemic (83.3%); 1 chameleon and 2 tortoises (1 endemic and vulnerable, although both species are protected game and CITES Appendix 2). Gecko's (6 species with 5 species being endemic); Lizards (13 species with 7 species being endemic) and Snakes (10 species with 5 species being endemic) are the most important groups of reptiles expected from the general area. With approximately 129 species of lizards (Lacertilia) Namibia, has one of the continents richest lizard fauna (Griffin 1998a). The most important reptiles expected to occur in the general area are the endemic species, especially *Chersobius (Homopus) solus* (Nama padloper tortoise), *Chersina angulata* (angulate tortoise) and the various *Meroles* species and geckos.

Due to the fact that reptiles are an understudied group of animals, especially in Namibia, it is expected that more species may be located in the general EPL 7874 area than presented above.

However, none of the reptiles, especially the important species, are exclusively associated with the EPL 7874 area.

3.2 Amphibian Diversity

Amphibian diversity known and/or expected to occur in the general EPL 7874 area (literature study only) is presented in Table 2.

Table 2. Amphibian diversity known and/or expected to occur in the general EPL 7874 – i.e. southwestern Namibia – area.

Species: Scientific name	Species: Common name	Namibian conservation and legal status	International Status – IUCN
Rain Frog			
Breviceps macrops	Desert Rain Frog	Vulnerable	V
Rubber Frog			
Phrynomantis annectens	Marbled Rubber Frog	Endemic	LC
Sand Frogs			
Tomopterna tandyi	Tandy's Sand Frog		LC
Platannas			
Xenopus laevis	Common Platanna		LC

Endemic – (Griffin 1998b)
IUCN (2020): LC – Least Concern
Source for literature review: Carruthers (2001), Channing (2001), Channing and Griffin (1993), Du Preez and Carruthers (2009), IUCN (2020), Passmore and Carruthers (1995)

Amphibians are declining throughout the world due to various factors of which much has been ascribed to habitat destruction. Basic species lists for various habitats are not always available with Namibia being no exception in this regard while the basic ecology of most species is also unknown. Approximately 4,000 species of amphibians are known worldwide with just over 200 species known from southern Africa and at least 57 species expected to occur in Namibia. Griffin (1998b) puts this figure at 50 recorded species and a final species richness of approximately 65 species, 6 of which are endemic to Namibia. This "low" number of amphibians from Namibia is not only as a result of the generally marginal desert habitat, but also due to Namibia being under studied and under collected. Most amphibians require water to breed and are therefore associated with the permanent water bodies, mainly in northeast Namibia.

According to Mendelsohn *et al.* (2002), the overall frog diversity in the general area is estimated at between 1-3 species. Griffin (1998b) puts the species richness in the general area at 3 species with 9 species expected to occur in the Namib-Naukluft Park and 3 species along the Diamond Coast (now Tsau//Khaeb National Park).

According to the literature, only 4 species of amphibians can occur in suitable habitat in the general Lüderitz area. The area is under represented, with 1 rain frog, 1 rubber frog, 1 sand frog and 1 platanna known and/or expected (i.e. potentially could be found in the area) to occur in the area. Only 1 species (12.5%) namely *Phrynomantis annectens* (Marbled Rubber Frog) is classified as endemic to Namibia (Griffin 1998b) although *Breviceps macrops* (Desert Rain Frog) is classified as vulnerable mainly due to coastal disturbances – i.e. diamond mining activities (Du Preez and Carruthers 2009; IUCN 2020) – in the area.

The general sandy windswept saline coastal area is viewed as marginal habitat for most amphibians at the best of times (Cunningham and Jankowitz 2010) with the small drainage lines (and occasional ephemeral rocky pools) only potential viable amphibian habitat, albeit marginal amphibian habitat, when rainfall occurs at the coast – i.e. there is limited suitable amphibian habitat in the general area.

The most important, and least known, species is viewed as *Breviceps macrops* (Desert Rain Frog) due to its restricted range and habitat along the south-western Namib coastal areas facing much destruction from anthropomorphic – mainly mining – influences. In Namaqualand, they occur from the high-water mark up to 10km inland in suitable habitat (Du Preez and Carruthers 2009). However, although an estimated 80% of *B. macrops* range is expected to occur in Namibia, it is rare from Namibia and more numerous in South Africa's Namaqualand (Griffin 1998b). It is typically associated with coastal sand dune hummock areas and not expected to occur in the predominantly rocky coastal areas – i.e. dune hummock areas (should these occur, although not expected, with the closest sandy dune hummock areas known from the Elizabeth Bay area) in EPL 7874 would be potentially important habitat for this species.

However, none of the amphibians, especially the important species, are exclusively associated with the EPL 7874 area.

3.3 Mammal Diversity

Mammal diversity known and/or expected to occur in the general EPL 7874 area (literature study only) is presented in Table 3.

Namibia is well endowed with mammal diversity with at least 250 species occurring in the country. These include the well known big and hairy as well as a legion of smaller and lesser-known species. Currently 14 mammal species are considered endemic to Namibia of which 11 species are rodents and small carnivores of which very little is known. Most endemic mammals are associated with the Namib and escarpment with 60% of these rock-dwelling (Griffin 1998c). According to Griffin (1998c) the endemic mammal fauna is best characterized by the endemic rodent family *Petromuridae* (Dassie rat) and the rodent genera *Gerbillurus* and *Petromyscus*.

The general area is regarded as "low" in overall (all terrestrial species) diversity while the overall terrestrial endemism in the area on the other hand is viewed as "average" (Mendelsohn *et al.* 2002). The overall diversity and abundance of large herbivorous mammals (big game) is viewed as "low" with 1-2 species while the overall diversity of large carnivorous mammals (large predators) is determined at 4 species with brown hyena being the most important with "medium" densities expected in the area (Mendelsohn *et al.* 2002).

Table 3. Mammal diversity known and/or expected to occur in the general EPL 7874 – i.e. southwestern Namibia – area.

Species: Scientific name	Species: Common name	Namibian conservation and legal status	International Status		
			SARDB	IUCN	CITES
Moles					
Eremitalpa granti	Grant's Golden Mole	Endemic; Secure	V		
Elephant Shrews					
Macroscelides proboscideus flavicaudatus	Round-eared Elephant-shrew	Endemic; Secure			
Bats					
Lissonycteris angolensis	*Angolan Soft-furred Fruit Bat	Not listed			
Micropteropus pusillus	*Peter's Lesser Epauletted Fruit Bat	Not listed			
Rhinolophus capensis	Cape Horseshoe Bat	Secure	NT		
Rhinolophus darlingi	Darling's Horseshoe Bat	Secure	NT		
Taphozous mauritianus	Mauritian Tomb Bat	Secure			
Nycteris thebaica	Egyptian Slit-faced Bat	Secure			
Chaerephon ansorgei	*Ansorge's Free-tailed Bat	Not listed			
Tadarida aegyptiaca	Egyptian Free-tailed Bat	Secure			
Miniopterus natalensis	Natal Long-fingered Bat	Secure	NT		
Cistugo seabrai	Namibian Wing-gland Bat	Endemic; Rare	V		
Eptesicus hottentotus	Long-tailed Serotine Bat	Secure			
Neoromicia zuluensis	Zulu Serotine Bat	Secure			
Hares and Rabbits					
Lepus capensis	Cape Hare	Secure			
Rodents					
Porcupine					
Hystrix africaeaustralis	Porcupine	Secure			
Rats and Mice					
Aethomys namaquensis	Namaqua Rock Mouse	Secure			
Parotomys littledalei namibensis	Littledale's Whistling Rat	Endemic; Secure	NT		
Desmodillus auricularis	Cape Short-tailed Gerbil	Secure			
Gerbillurus paeba	Hairy-footed Gerbil	Secure			
Carnivores					
Parahyaena (Hyaena) brunnea	Brown Hyena	Insufficiently known; (Vulnerable?); Peripheral; Protected Game	NT	NT	
Crocuta crocuta	Spotted Hyena	Secure?; Peripheral; Protected Game	NT		
Felis silvestris	African Wild Cat	Vulnerable			C2
Vulpes chama	Cape Fox	Vulnerable?; Protected Game			

Canis mesomelas	Black-backed Jackal	Secure; Problem animal
Ictonyx striatus	Striped Polecat	Secure
Antelopes		
Oryx gazella	Gemsbok	Secure; Huntable game
Sylvicapra grimmia	Common Duiker	Secure
Antidorcas marsupialis	Springbok	Secure; Huntable game
Raphicerus campestris	Steenbok	Secure; Protected Game

SARDB (2004): NT – Near Threatened, V – Vulnerable
IUCN (2020): NT – Near Threatened. All other species classified as Least Concern (LC)
CITES: CITES Appendix 2 species
* - Monandjem *et al.* (2010)
Endemic: Includes all taxa with 75% or more of the entire taxon's population residing in Namibia with no conservation "problems" implied (Griffin and Coetzee 2005)
Source for literature review: De Graaff (1981), Griffin and Coetzee (2005), Estes (1995), IUCN (2020), Joubert and Mostert (1975), Monandjem *et al.* (2010), Skinner and Smithers (1990), Skinner and Chimimba (2005), Stander and Hanssen (2003) and Taylor (2000)

The overall mammal diversity in the area is estimated at between 16-30 species with 1-2 species being endemic to the area (Mendelsohn *et al.* 2002). Griffin (1998c) estimates at least 80 species of mammals occurring in the neighbouring Namib-Naukluft Park and 25 species along the Diamond Coast (now Tsau//Khaeb National Park).

According to the literature at least 30 species of mammals are known and/or expected to occur in the general area of which 4 species (13.3%) are classified as endemic. The Namibian legislation further classifies 1 species as rare (*Cistugo seabrai*), 3 species as vulnerable, 4 species as protected game, 2 species as huntable game, 1 species as problem animal, 2 species as peripheral and 1 species as insufficiently known. Three species – all bats – are not listed and potentially occur in Namibia according to habitat modelling (Monandjem *et al.* 2010). At least 40% (12 species) of the mammalian fauna that occur or are expected to occur in the area are represented by bats followed by rodents and carnivores with 6 species each (20%). Nine species have some form of international conservation status of which 1 and 6 species each are classified as near threatened by the IUCN (2020) and the SARDB (2004), respectively. Two species are also classified as vulnerable by the SARDB (2004) while 1 species is listed as a CITES Appendix 2 species. Habitat alteration and overutilization are the two primary processes threatening most mammals (Griffin 1998c) with species probably underrepresented in the above mentioned table for the general area being the bats, as this group has not been well documented from the arid south western part of Namibia.

The most important species occurring in the general area are viewed as the endemics and especially *Cistugo seabrai* (endemic and rare), *Parahyaena* (*Hyaena) brunnea* (insufficiently known, vulnerable, peripheral, protected game and near threatened – population decreasing), *Felis silvestris* (vulnerable and CITES Appendix 2) and *Vulpes chama* (vulnerable ? and protected game) (See Table 3).

However, none of the mammals, especially the important species, are exclusively associated with the EPL 7874 area.

3.4 Avian Diversity

Bird diversity known and/or expected to occur in the general EPL 7874 area (literature study only) is presented in Table 4.

Table 4 indicates the avian diversity known and/or expected to occur in the general Lüderitz area. This table excludes migratory birds (e.g. Petrel, Albatross, Skua, etc.) and species breeding extralimital (e.g. stints, sandpipers, etc.) and rather focuses on birds that are breeding residents or can be found in the area during any time of the year. This would imply that many more birds (e.g. Palaearctic migrants) could occur in the area depending on "favourable" environmental conditions.

Although Namibia's avifauna is comparatively sparse compared to the high rainfall equatorial areas elsewhere in Africa, approximately 658 species have already been recorded with a diverse and unique group of arid endemics (Brown *et al.* 1998, Maclean 1985). Fourteen species of birds are endemic or near endemic to Namibia with the majority of Namibian endemics occurring in the savannas (30%) of which ten species occur in a north-south belt of dry savannah in central Namibia (Brown *et al.* 1998). Bird diversity is viewed as "low" in the Lüderitz area with 51-80 species estimated with at least 1-3 species being endemic to the general area (Mendelsohn *et al.* 2000). The Lüderitz lagoon area is viewed as a site of special ecological importance for migrant shorebirds and seabird breeding site (Curtis and Barnard 1998). Up to 10,080 birds and 53 species are known to frequent various Lüderitz birding sites (Robertson *et al.* 2012).

Table 4. Bird diversity known and/or expected to occur in the general EPL 7874 – i.e. southwestern Namibia – area.

Species: Scientific name	Species: Common name	Namibian conservation and legal status	International Status	
			Southern Africa	IUCN
Struthio camelus	Common Ostrich			
Rhinopomastus cyanomelas	Common Scimitarbill			
Merops hirundineus	Swallow-tailed Bee-eater			
Tachymarptis melba	Alpine Swift			
Columba guinea	Speckled Pigeon			
Streptopelia senegalensis	Laughing Dove			
Neotis ludwigii	Ludwig's Bustard		Near endemic	E
Ardeotis kori	Kori Bustard	Near Threatened		NT
Eupodotis vigorsii	Karoo Korhaan		Endemic	
Pterocles namaqua	Namaqua Sandgrouse		Near endemic	
Haematopus moquini	African Black Oystercatcher	Near Threatened	Endemic	
Charadrius pecuarius	Kittlitz's Plover			
Charadrius marginatus	White-fronted Plover			
Vanellus armatus	Blacksmith Lapwing			
Vanellus coronatus	Crowned Lapwing			
Cursorius rufus	Burchell's Courser		Near endemic	
Larus dominicanus	Kelp Gull			
Larus cirrocephalus	Grey-headed Gull			
Larus hartlaubii	Hartlaub's Gull	Vulnerable	Endemic	
Thalasseus (Sterna) bergii	Swift Tern			
Sternula (Sterna) balaenarum	Damara Tern	End; Near Threatened	Breeding endemic	V
Torgos tracheliotus	Lappet-faced Vulture			E
Circaetus pectoralis	Black-chested Snake-Eagle			
Circus maurus	Black Harrier	Endangered		E
Buteo rufofuscus	Jackal Buzzard		Endemic	
Aquila verreauxii	Verreaux's Eagle	Near Threatened		
Falco rupicolus	Rock Kestrel			
Falco rupicoloides	Greater Kestrel			
Falco biarmicus	Lanner Falcon			
Bubu capensis	Cape Eagle Owl	Near Threatened		
Tachybaptus ruficollis	Little Grebe			
Podiceps nigricollis	Black-necked Grebe	Near Threatened		
Morus capensis	Cape Gannet	Critically Endangered	Breeding endemic	E

Microcarbo (Phalacrocorax) coronatus	Crowned Cormorant	Near Threatened	Endemic	NT
Phalacrocorax lucidus	White-breasted Cormorant			
Phalacrocorax neglectus	Bank Cormorant	Endangered	Endemic	E
Phalacrocorax capensis	Cape Cormorant	Endangered	Breeding endemic	E
Egretta garzetta	Little Egret			
Egretta intermedia	Yellow-billed Egret			
Egretta alba	Great Egret			
Ardea cinerea	Grey Heron			
Ardea melanocephala	Black-headed Heron			
Ardea purpurea	Purple Heron			
Bubulcus ibis	Cattle Egret			
Nycticorax nycticorax	Black-crowned Night-Heron			
Scopus umbretta	Hamerkop			
Phoenicopterus ruber	Greater Flamingo	Vulnerable		
Phoenicopterus minor	Lesser Flamingo	Vulnerable		NT
Pelecanus onocrotalus	Great White Pelican	Vulnerable		
Spheniscus demersus	African Penguin	Endangered	Endemic	E
Dicrurus adsimilis	Fork-tailed Drongo			
Nilaus afer	Brubru			
Telophorus zeylonus	Bokmakierie		Near endemic	
Batis pririt	Pririt Batis		Near endemic	
Corvus capensis	Cape Crow			
Corvus albus	Pied Crow			
Lanius collaris	Common Fiscal			
Parus afer	Grey Tit		Endemic	
Riparia paludicola	Brown-throated Martin			
Hirundo cucullata	Greater Striped Swallow			
Hirundo fuligula	Rock Martin			
Pycnonotus nigricans	African Red-eyed Bulbul		Near endemic	
Eremomela icteropygialis	Yellow-bellied Eremomela			
Eremomela gregalis	Karoo Eremomela			
Acrocephalus baeticatus	African Reed-Warbler			
Acrocephalus gracilirostris	Lesser Swamp-Warbler			
Parisoma layardi	Layard's Tit-Babbler		Endemic	
Parisoma subcaeruleum	Chestnut-vented Tit-Babbler		Near endemic	
Zosterops pallidus	Orange River White-eye		Endemic	
Prinia flavicans	Black-chested Prinia			

Calendulauda barlowi	Barlow's Lark		Endemic
Calendulauda erythrochlamys	Dune Lark	End	Endemic
Ammomanopsis grayi	Gray's Lark	End	Near endemic
Eremopterix verticalis	Grey-backed Sparrowlark		Near endemic
Calandrella cinerea	Red-capped Lark		
Alauda starki	Stark's Lark		Endemic
Monticola brevipes	Short-toed Rock Thrush		
Bradornis infuscatus	Chat Flycatcher		Near endemic
Cercotrichas coryphoceus	Karoo Scrub-Robin		Endemic
Oenanthe monticola	Mountain Wheatear		
Oenanthe pileata	Capped Wheatear		
Cercomela schlegelii	Karoo Chat		Near endemic
Cercomela tractrac	Tractrac Chat		Near endemic
Cercomela familiaris	Familiar Chat		
Onychognanthus nabouroup	Pale-winged Starling		Near endemic
Nectarinia fusca	Dusky Sunbird		Near endemic
Ploceus velatus	Southern Masked-Weaver		
Estrilda astrild	Common Waxbill		
Passer domesticus	House Sparrow		
Passer motitensis	Great Sparrow		Near endemic
Passer melanurus	Cape Sparrow		Near endemic
Motacilla capensis	Cape Wagtail		
Serinus flaviventris	Yellow Canary		Near endemic
Serinus albogularis	White-throated Canary		Near endemic
Emberiza impetuani	Lark-like Bunting		Near endemic
Emberiza capensis	Cape Bunting		Near endemic

Southern Africa: E - Endemic, N-end - Near Endemic (Hockey *et al.* 2006)
Namibia: E – Endangered, NT – Near Threatened, V - Vulnerable (Simmons and Brown In press), End – Endemic (Simmons *et al.* 2015)
IUCN (2020): E – Endangered, V – Vulnerable, NT – Near Threatened [All other species are listed as LC (Least Concern) or have not yet been assessed by the IUCN Red List]
Source for literature review: Brown *et al.* (1998), Hockey *et al.* (2006), IUCN (2020), Komen (n.d.), Maclean (1985), Peacock (2015), Peacock (2016), Simmons *et al.* (2015), and Tarboton (2001)

According to the literature review, at least 97 species of breeding resident birds occur and/or could occur in the general Lüderitz area at any time (Hockey *et al.* 2006, Maclean 1985, Simmons *et al.* 2015, Tarboton 2001). Although many of the species mentioned in Table 4 do not occur permanently in the general area, environmental conditions such as "berg winds" ("East weather" – local vernacular) often brings unexpected avian guests to the coastal areas although these are not resident all year (Pers obs). All the migrant species; extralimital breeders and vagrants have been excluded here, although the Lüderitz area serves as an important feeding ground for a variety of mainly aquatic species. The islands – Mercury, Icaboe and Possesion – in the vicinity of Lüderitz are considered globally important areas because of the numbers of coastal seabirds that use these islands for breeding (Kolberg n.d.). Smaller island within the Lüderitz Bay – Seal, Penguin and Halifax – are also considered globally important bird areas for the same reasons and could thus also become RAMSAR sites (Kolberg n.d.).

Three of the 14 Namibian endemic bird species (21.4% of all Namibian endemic species or 3.1% of the species expected to occur in the area) can or are likely to occur in the general Lüderitz area. According to Simmons *et al.* (2015) 1 species is classified as critically endangered (Cape gannet), 4 species as endangered (black harrier, bank cormorant, Cape cormorant, African penguin), 4 species as vulnerable (Hartlaub's gull, greater flamingo, lesser flamingo, great white pelican) and 7 species as near threatened (kori bustard, African black oystercatcher, Damara tern, Verreaux's Eagle, Cape eagle owl, black-necked grebe, crowned cormorant) from Namibia. Furthermore, 7 species are classified as endangered (Ludwig's bustard, lappet-faced vulture, black harrier, Cape gannet, bank cormorant, Cape cormorant, African penguin; 1 species as vulnerable (Damara tern) and 3 species as near threatened (kori bustard, lesser flamingo, crowned cormorant) by the IUCN (2020). According to the southern African status for birds 20 species are viewed as near endemic; 14 species as endemic and 3 species as breeding endemics (Hockey *et al.* 2006).

According to Simmons *et al.* (2015) 28 wetland bird species are of special concern in Namibia. The Namib coast is especially important for 8 species and in terms of global populations it supports >90% of the world's chestnut-banded plovers (*Charadrius pallidus*); 31% of Cape Teals (*Anas capensis*); and 26% of African black oystercatchers (*Haematopus moquini*). In terms of African endemic races, it supports: >90% of the black-necked grebe (*Podiceps nigricollis gurneyi*); and 33% of the white-fronted plover (*Charadrius m. Marginatus*); and in terms of southern African sub-continental populations it supports 31% of pied avocets (*Recurvirosta avocetta*), 13.7% of greater flamingos (*Phoenicopterus roseus*) and 10.3% of lesser flamingos (*Phoenicopterus minor*) (Williams and Simmons 2008a). Furthermore, up to 200,000 Holarctic shorebirds are supported seasonally along the Namibian coast belonging largely to 12 annually occurring species, of which 5 species occur in numbers that form a significant proportion of the southern African flyway populations – e.g. curlew sandpiper (*Calidris ferruginea* 35%); sanderling (*C. alba* 32%); ruddy turnstone (*Arenaria interpres* 17.5%); grey plover (*Pluvialis squatarola* 7.8%) and red knot (*Calidris canutus* 1.6%) (Williams and Simmons 2008).

Although Lüderitz is not classified as an Important Birding Area (IBA) the Lüderitz Bay islands have a globally IBA status while other important birding areas close to Lüderitz include the Sperrgebiet (Global IBA), Possession Island (Global IBA), Mercury Island (Global IBA) and Ichaboe Island (Global IBA) (Simmons 1998a). Coastal areas and wetlands are immensely important as 8 and 34 bird species are classified as critically endangered, endangered or vulnerable in each of the biomes (i.e. Coastal areas and Wetlands), respectively (Simmons 1998a). The Lüderitz lagoon is viewed as a place of conservation importance although not formally protected (Robertson *et al.* 2012).

A published summer bird count from the Lüderitz area indicate between 3 and 16 species and 8 and 1009 individual birds – e.g. Aeroplane Bay (9 species and 39 individuals), Agate Beach (3 species and 8 individuals), Griffith Bay (16 species and 56 individuals), Grosse

Bucht (10 species and 218 individuals), Guano Bay (12 species and 1009 individuals), Radford Bay (8 species and 34 individual), Second Bay (14 Species and 397 individuals) and Shearwater Bay (4 species and 66 individuals) (Kolberg 2013).

Breeding residents of conservation concern (nationally/internationally):

- African black oystercatcher (Vulnerable – Namibia);
- Damara tern (Endemic and Endangered – Namibia; Vulnerable – IUCN 2020);
- Cape gannet (Specially Protected – Namibia; Endangered – IUCN 2020);
- Crowned cormorant (Near Threatened – IUCN 2020);
- Bank cormorant (Specially Protected – Namibia; Endangered – IUCN 2020);
- Cape cormorant (Endangered – IUCN 2020);
- Greater flamingo (Vulnerable – Namibia); and
- Lesser flamingo (Vulnerable – Namibia; Near Threatened – IUCN 2020).

Above mentioned species as well as those classified as endangered (Ludwig's bustard, lappet-faced vulture, black harrier, Cape gannet, bank cormorant, Cape cormorant, African penguin; vulnerable (Damara tern) and near threatened (lesser flamingo, crowned cormorant) by the IUCN (2020) and critically endangered (Cape gannet), endangered (black harrier, bank cormorant, Cape cormorant, African penguin), vulnerable (Hartlaub's gull, greater flamingo, lesser flamingo, great white pelican) and near threatened (kori bustard, African black oystercatcher, Damara tern, Verreaux's Eagle, Cape eagle owl, black-necked grebe, crowned cormorant) from Namibia (Simmons *et al.* 2015) are viewed as the most important occurring in the general area.

However, none of the birds, especially the important species, are exclusively associated with the EPL 7874 area.

3.5 Tree and Shrub Diversity

It is estimated that at least 24 species of larger trees and shrubs (>1m in height) occur in the general Lüderitz area according to Mannheimer and Curtis (2018) – i.e. potentially also occur in the general EPL 7874 area.

Table 5 indicates the larger trees and shrubs known and/or expected to occur in the general Lüderitz area. These are derived from Mannheimer and Curtis (2018) and species indicated below are know from the quarter-degree square distribution principle used and don't necessarily occur throughout the entire area, especially not the immediate coastal Lüderitz area.

Table 5. Larger tree and shrub diversity known and/or expected to occur in the general EPL 7874 – i.e. southwestern Namibia – area.

Species: Scientific name	Conservation status
Acanthosicyos horridus	Near-endemic, F
Aloe dichotoma	Near-endemic; F, NC, C2
Anisostigma schenckii	Endemic
Capparis hereroensis	Endemic
Ceraria fruticulosa	Near-endemic
Ceraria namaquensis	Near-endemic
Commiphora capensis	Near-endemic, F
Diospyros ramulosa	
Ectadium latifolium	Endemic
Euphorbia gummifera	Near-endemic; C2
Ficus cordata	F
Laggera decurrens	
Lycium cinereum	

Lycium horridum	
Lycium pilifolium	
Lycium tetrandrum	
Ozoroa crassinervia	
Ozoroa dispar	
Searsia populifolia	
Salsola spp.	
Tylecodon paniculatus	NC
Zygophylum morgsana	
Zygophyllum prismatocarpum	Near-endemic
Zygophyllum retrofractum	Near-endemic

Endemic and Near-endemic (Craven 1999, Loots 2005, Mannheimer and Curtis 2018)
F – Protected: Forest Act No. 12 of 2001
NC – Protected: Nature Conservation Ordinance No. 4 of 1975
C2 – CITES Appendix 2 spp.
Source for literature review: Craven (1999), IUCN (2020), Loots (2005), Mannheimer and Curtis (2018)

Thirteen (54.2%) of the estimated 24 species expected to occur in the general Lüderitz area have some form of conservation status (this includes endemic and near-endemic species). Three species are classified as endemic (*Anisostigma schenckii*, *Capparis hereroensis*, *Ectadium latifolium*) (12.5%); 8 species as near-endemic (33.3%); 4 species are protected by the Forest Act No.12 of 2001 (16.7%), 2 species are protected by the Nature Conservation Ordinance No. 4 of 1975 (8.3%) and 3 species are listed by CITES as Appendix 2 species (12.5%). The most important species as those viewed as endemic and near-endemic.

Burke (2006) lists 14 species as being typical – i.e. key species – of the Lüderitz Peninsula dwarf-shrubland and 9 species from the Rocky Coast dwarf-shrubland (Table 6).

Table 6. Vegetation diversity of the Lüderitz Peninsula dwarf-shrubland and Rocky Coast dwarf-shrubland as presented by Burke (2006) (This table includes grasses). Species indicated below are the "key" species know from each vegetation type.

Species: Scientific name	Lüderitz peninsula dwarf-shrubland	Rocky Coast dwarf-shrubland	Conservation status
Asparagus capensis	√		
Amphibolia rupis-arcuatae		√	
Augea capensis	√		
Brownanthus marlothii	√	√	Near endemic
Cladoraphis cyperoides		√	
Didelta carnosa var. *tomentosa*		√	
Ectadium latifolium	√		Endemic
Eremothamnus marlothianus		√	Endemic
Euphorbia cibdela	√		
Galenia fruticosa	√		
Gazania jurineifolia	√		Near endemic
Hypertelis angrae-pequenae	√		
Lebeckia multiflora	√		
Limonium dyeri	√	√	Endemic
Lycium decumbens		√	
Lycium tetrandum	√		
Crassothonna (Othonna) furcata		√	
Pelargonium cortusifolium	√		Endemic
Pelargonium spp.		√	
Salsola spp.	√		
Zygophyllum clavatum	√		

Endemic and Near-endemic (Burke 2006, Mannheimer *et al.* 2008)

According to Burke (2006) the Lüderitz Peninsula dwarf-shrubland is the most diverse coastal vegetation type between Lűderitz and Oranjemund regarding key plant species with 14 species of which 3 species are endemic (21.4%) and 2 species are near-endemic (14.3%) while the Rocky Coast dwarf-shrubland has 9 key species of which 2 species are endemic (22.2%) and 1 species near endemic (11.1%). The most important key species according to Burke (2006) are viewed as the southern coastal endemics – e.g. *Limonium dyeri* and *Pelargonium cortusifolium*.

Table 7. Important species – i.e. Red Data spp. – known to occur in the general Lüderitz area according to Loots (2005).

Species: Scientific name	Conservation status
Aloe pachygaster	Endemic, NC, C2, LC
Antimima buchubergensis	Endemic, NC, Rare
Brownanthus namibensis	Endemic, LC
Conophytum saxetanum	NC, LC
Crassula ausensis	Endemic, LC
Crassula elegans subsp. *namibensis*	Endemic, NT
Drimia secunda	Endemic, Rare
Euphorbia angrae	Endemic, C2, LC
Euphorbia verruculosa	Endemic, C2, LC
Fenestraria rhopalophylla subsp. *rhopalophylla*	Endemic, NC, LC
Ferraria schaeferi	LC
Hoodia alstonii	NC, LC
Jensenobotrya lossowiana	Endemic, NC, NT
Lithops karasmontana subsp. *eberlanzii*	Endemic, C2, LC
Juttadinteria kovisimontana	Endemic, NC, V
Juttadinteria simpsonii	Endemic, NC, NT
Lachenalia klinghardtiana	Endemic, Rare
Lebeckia dinteri	Endemic, LC
Lithops francisci	Endemic, NC, V
Lithops karasmontana subsp. *eberlanzii*	Endemic, NC, LC
Lithops optica	Endemic, NC, NT
Lotononis pachycarpa	Endemic, LC
Oxalis luederitzii	Endemic, LC
Pteronia spinulosa	Endemic, LC
Psammophora nissenii	Endemic, NC, LC
Titanopsis schwantesii	Endemic, NC, NT

Endemic (Loots 2005)
NC – Nature Conservation Ordinance No. 4 of 1975
V – Vulnerable; NT – Near Threatened; LC – Least Concern (Loots 2005)

Loots (2005) lists at least 26 species of conservation concern – i.e. Red Data species – from the general Lüderitz area of which 23 species are endemic, 2 species viewed as rare (*Antimima buchubergensis*, *Lachenalia klinghardtiana*), 2 species as vulnerable (*Juttadinteria kovisimontana*, *Lithops francisci*), 5 species as near threatened, 13 species protected by the Nature Conservation Ordinance No. 4 of 1975 and 15 species viewed as least concern.

The most important species are viewed as the Red Data (See Loots 2005 – Table 7) and endemic species (See Burke 2006; Tables 5-7).

However, none of the larger trees/shrubs, especially the important species (e.g. Red Data and/or endemics), are exclusively associated with the EPL 7874 area.

3.6 Grass Diversity

It is estimated that up to 18 grasses – 5 to 14 species – (Burke 2003 [5 spp.], Mannheimer *et al.* 2008 [5 spp.], Müller 2007 [7 spp.], Müller 1984 [5 spp.], Van Oudshoorn 1999 [14 spp.]) occur in the general Lüderitz, area.

Table 8 indicates the grasses known and/or expected to occur in the general Lüderitz area and are derived from [1]Müller (1984), [2]Van Oudtshoorn (1999), [3]Burke (2003), [4]Mannheimer *et al.* (2008) and [5]Müller (2007).

Table 8. Grasses known and/or expected to occur in the general Lüderitz area.

Species: Scientific name	Status	Ecological Status	Grazing Value
[2]*Aristida congesta*		Increaser 2	Low
[1,2,4,5]*Centropodia glauca*		Decreaser	High
[3,4]*Cladoraphis cyperoides*		?	Low
[2,3,4]*Cladoraphis spinosa*		Increaser 1	Average
[2]*Cynodon dactylon*		Increaser 2	High
[1,2,5]*Enneapogon desvauxii*		Intermediate	Average
[1,2,5]*Enneapogon scaber*		?	Low
[2]*Eragrostis nindensis*		Increaser 2	Average
[2]*Fingerhuthia africana*		Decreaser	Average
[2]*Polypogon monspeliensis*		Exotic	Average
[2]*Schmidtia kalahariensis*		Increaser 2	Low
[2]*Setaria verticillata*		Increaser 2	Average
[1,2,3,5]*Stipagrostis ciliata*		Decreaser	High
[5]*Stipagrostis fastigiata*		?	High
[3,4]*Stipagrostis geminifolia*	Near-endemic	?	?
[2,5]*Stipagrostis namaquensis*		?	Average
[3,4]*Stipagrostis sabulicola*	Endemic	?	?
[1,2,5]*Stipagrostis obtusa*		Decreaser	High

Endemic and Near-endemic – (Burke 2003, Burke 2006, Mannheimer *et al.* 2008)

Grasses are not well represented in the Succulent Karoo even in historical times although some scientists debate this (Lovegrove 1993). One grass is viewed as endemic (*Stipagrostis sabulicola*) and 1 species as near-endemic (*Stipagrostis geminifolia*) in the general Lüderitz area. However, most of the species in Table 5 probably do not occur within Lüderitz, especially not close to the coast, but rather further inland, especially after rainfall events, although still within the general Lüderitz area.

None of the grasses mentioned in Table 8 are exclusively associated with the EPL 7874 area and generally not viewed as very important in the winter rainfall and rocky coastal areas (e.g. Sperrgebied).

3.7 Important Species

Reptiles
The high percentage of endemic reptile species (56.3%) known and/or expected to occur in the general area underscores the importance of this area for reptiles.

The most important species expected to occur in the general is viewed as the endemic Nama padloper (*Chersobius (Homopus) solus*) and angulate tortoise (*Chersina angulata*) as well as the 2 *Meroles* species – *Meroles micropholidotus* and *M. suborbitalis* (Branch 1998, Griffin 2003). The Nama padloper (*Chersobius (Homopus) solus*) is known to occur in the Kowisberge (Branch 1998) although they are more common further east – e.g. Aus area

(Cunningham and Simang 2007), but potentially could occur in the rocky coastal areas around Lűderitz while the angulate tortoise has a limited distribution in Namibia between Oranjemund and Lűderitz (the Lűderitz area being it's most northerly distribution in Namibia although they are more common in the Oranjemund area). Griffin (1998a) views tortoises as the most threatened and important group of reptile occurring in Namibia.

However, none of the reptiles are exclusively associated with the EPL 7874 area.

Amphibians
The most important species is viewed as *Breviceps macrops* due to its restricted range and habitat along the south-western Namib coastal areas facing much destruction from anthropomorphic – mainly mining – influences. However, *B. macrops* is mainly associated with dune hummock areas and not expected to occur in the proposed development area which is dominated by rocky terrain. Furthermore, the general area is viewed as marginal habitat for most amphibians at the best of times (Cunningham and Jankowitz 2010).

However, none of the amphibians are exclusively associated with the EPL 7874 area, but dune hummocks in the Grosse Bucht and opposite Halifax Island (as well as along some of the sandy drainage line depressions) should be viewed as potential desert rain frog (*Breviceps macrops*) habitat and investigated further.

Mammals
The most important species occurring in the general area are viewed as the endemics and especially *Cistugo seabrai* (endemic and rare), *Parahyaena* (*Hyaena) brunnea* (insufficiently known, vulnerable, peripheral, protected game and near threatened – population decreasing), *Felis silvestris* (vulnerable and CITES Appendix 2) and *Vulpes chama* (vulnerable ? and protected game).

However, none of the mammals are exclusively associated with the EPL 7874 area, but brown hyena den sites in the Peninsula area, are viewed as important sites and should be investigated further.

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Birds
The most important bird species expected to occur in the proposed development area are the breeding residents of conservation concern (nationally/internationally) (e.g. African black oystercatcher, Damara tern, Cape gannet, crowned cormorant, bank cormorant, Cape cormorant, greater flamingo and lesser flamingo); those species classified as endangered (Ludwig's bustard, lappet-faced vulture, black harrier, Cape gannet, bank cormorant, Cape cormorant, African penguin; vulnerable (Damara tern) and near threatened (lesser flamingo, crowned cormorant) by the IUCN (2020); those species classified as critically endangered (Cape gannet), endangered (black harrier, bank cormorant, Cape cormorant, African penguin), vulnerable (Hartlaub's gull, greater flamingo, lesser flamingo, great white pelican) and near threatened (kori bustard, African black oystercatcher, Damara tern, Verreaux's Eagle, Cape eagle owl, black-necked grebe, crowned cormorant) from Namibia (Simmons *et al.* 2015) and the various Palaearctic and other migrants frequenting the coastal areas (e.g. chestnut-banded plovers, black-necked grebe, white-fronted plover, pied avocets, curlew sandpiper, sanderling, ruddy turnstone, grey plover and red knot). African penguin (endangered), which breed on Halifax Island, numbers have been declining due to various reasons and any further disturbance that may exacerbate this is disconcerting. Furthermore, even Lüdwig's bustard (near endemic; endangered) is known to breed in the Peninsula area during favourable conditions (Kemper *Pers. com.*) indicating the importance of the general area.

However, none of the birds are exclusively associated with the EPL 7874 area.

Trees/shrubs
The most important larger trees/shrubs known and/or expected to occur in the general area are the endemics (*Anisostigma schenckii*, *Capparis hereroensis*, *Ectadium latifolium*) – See Table 5 (Mannheimer and Curtis 2018).

According to Burke (2006) the Lüderitz Peninsula dwarf-shrubland is the most diverse coastal vegetation type between Lűderitz and Oranjemund regarding key plant species with 14 species of which 3 species are endemic (21.4%) and 2 species are near-endemic (14.3%) while the Rocky Coast dwarf-shrubland has 9 key species of which 2 species are endemic (22.2%) and 1 species near endemic (11.1%) – See Table 6. The most important key species according to Burke (2006) are viewed as the southern coastal endemics – e.g. *Limonium dyeri* and *Pelargonium cortusifolium*.

Loots (2005) lists at least 26 species of conservation concern – i.e. Red Data species – from the general Lüderitz area of which 23 species are endemic, 2 species viewed as rare (*Antimima buchubergensis*, *Lachenalia klinghardtiana*), 2 species as vulnerable (*Juttadinteria kovisimontana*, *Lithops francisci*), 5 species as near threatened, 13 species protected by the Nature Conservation Ordinance No. 4 of 1975 and 15 species viewed as least concern. The most important species are viewed as the Red Data (See Loots 2005 – Table 7) and endemic species (See Burke 2006 – Tables 5-7).

However, none of the vegetation (trees/shrubs/succulents, etc.) is exclusively associated with the EPL 7874 area, but patches of unique species (See above) are expected to occur in the Peninsula area, and these patches would be viewed as important areas and should be investigated further.

Grass
Grasses are not well represented in the Succulent Karoo with 1 species viewed as endemic (*Stipagrostis sabulicola*) and 1 species as near-endemic (*Stipagrostis geminifolia*). Except for their grazing and soil stabilization value, none of the grasses are viewed as particularly important in the general area.

However, none of the grasses are exclusively associated with the EPL 7874 area.

Other species
Aloe
Aloes are protected throughout Namibia and although the south western desert areas are not favourable habitat for most aloes. However, there are a number of species (not included in Tables 5-7) occurring in the general area – e.g. *Aloe microstigma*, *A. striata* ssp. *karasbergensis* and *A. variegata* (Rothmann 2004).

Ferns
At least 64 species of ferns, of which 13 species being endemic, occur throughout Namibia. Ferns in the general area include at least 1 indigenous species (*Ophioglossum polyphyllum*) and 3 endemic species (*Cheilanthes rawsonii*, *C. deltoidea* and *C. namaquensis*) (Crouch *et al.* 2011). Although the general area is marginal habitat for ferns it is undercollected with more species probably occurring than presented above.

Lithops
Many plants – e.g. *Lithop* species – have suffered from unscrupulous collectors in the past. *Lithops optica*, *L. francisci* and *L. karasmontana* subsp. *aiaisensis* are the species expected to occur in the general area, although only *Lithops optica* expected to occur on the Peninsula (Cole and Cole 2005).

Lichens
Burke (2006) indicates the importance of lichens in the general Lüderitz area. The overall diversity of lichens is poorly known from Namibia, especially the coastal areas and statistics on endemicity is even sparser (Craven 1998). More than 100 species (~120) are expected to occur in the Namib Desert with the majority being uniquely related to the coastal fog belt (Wirth 2010). Lichen diversity is related to air humidity and generally decreases inland form the Namibian coast (Schults and Rambold 2007). Off road driving is the biggest threat to these lichens which are often rare and unique to Namibia. To indicate how poorly known lichens are from Namibia, the recent publication by Schultz *et al.* (2009) indicating that 37 of the 39 lichen species collected during BIOTA surveys in the early/mid 2000's were new to science (i.e. new species), is a case in point. Lichens are slow growing and any destruction (e.g. especially off-road driving) leaves very long-lasting scars (Robertson *et al.* 2012, Seely 2010).

However, none of the "other" flora is exclusively associated with the EPL 7874 area, but the presence of patches of unique species such as *Lithops optica*, etc. should be investigated further.

3.8 Important Areas

Important biodiversity areas – i.e. potential "hotspot" areas – in the EPL 7874 area are (See Figure 3):

1. Halifax Island
This island is protected (Marine Protected Area) and has a global Important Bird Area (IBA) status. The second largest Namibian breeding population of African penguin (endangered) occurs here although their numbers steadily decrease due to various reasons – e.g. fish stocks diminishing; lack of suitable breeding dens; predators; disturbances; pollution, etc. Any further disturbance close to the island may exacerbate the plight of this African penguin population (See white circle in Figure 3).

2. Rocky Areas – Ridges/Hills/Outcrops
Rocky areas – i.e. ridges/hills/outcrops, etc. – are unique habitat to a variety of important flora (including lichens) and reptiles as well as have suitable sites for dens/refuges for mammals (e.g. brown hyena, various bats, etc.) and birds (e.g. Cape eagle owl) (See black oblongs in Figure 3).

3. Sandy dune hummocks
Although there are not extensive sandy dune hummocks in the proposed development area, there are patches of vegetated sand, which may serve as potential habitat to the desert rain frog (*Breviceps macrops*) (See yellow dotted lines in Figure 3).

4. Patches of unique flora
Unique species – i.e. Red Data, endemic, protected, etc. – are not evenly distributed throughout the area and not always associated with a visible habitat (although could be), but rather small patchy unobtrusive micro-habitats. Such areas are often associated with rocky features and may include patches of *Conophytum*, *Crassula*, *Lavrania*, *Lithops* and *Ruschia* species, etc.

Above mentioned areas (See Figure 3) have not been extensively surveyed by specialists and are at best broad indications of potential important habitats with unique species. Therefore, it is important to identify and confirm unique areas/species, etc. prior to any development activities.

Figure 3. Important areas – i.e., potential "biodiversity "hotspot" areas – in EPL 7874. White circle = Halifax Island (e.g., African penguin breeding site); black oblongs = rocky areas (e.g., unique flora) and yellow dotted areas = sandy areas (e.g., desert rain frog).

4 Conclusion

It is estimated that at least 32 reptile, 4 amphibian, 30 mammal, 95 bird species (breeding residents), 15 to 22 species of larger trees and shrubs (>1m) and at least 5 to 14 species of grasses (approximately 18 species) are known to or expected to occur in the general/immediate EPL 7874 area of which a large proportion are endemics. Endemics include at least 56.3% of the reptiles, 12.5% of the amphibians, 13.35% of the mammals, 2.9% of all the breeding and/or resident birds and numerous of the flora – See Tables 5-7 – known and/or expected to occur in the general area.

The most important reptile species expected to occur in the area are the tortoises, especially the Nama padloper, and the *Meroles* species (*Meroles micropholidotus* and *M. suborbitalis*)

Amphibians are not well represented in the area with little suitable habitat and are not viewed as very important.

The most important mammals are viewed as the endemics especially the Namibian wing-gland bat (*Cistugo seabrai*), brown hyena (*Hyaena brunnea*), African wild cat (*Felis silvestris*) and Cape fox (*Vulpes chama*).

The most important bird species expected to occur in the proposed development area are the breeding residents of conservation concern (nationally/internationally) (e.g. African black oystercatcher, Damara tern, Cape gannet, crowned cormorant, bank cormorant, Cape cormorant, greater flamingo and lesser flamingo); those species classified as endangered (Ludwig's bustard, lappet-faced vulture, black harrier, Cape gannet, bank cormorant, Cape cormorant, African penguin; vulnerable (Damara tern) and near threatened (lesser flamingo, crowned cormorant) by the IUCN (2020); those species classified as critically endangered (Cape gannet), endangered (black harrier, bank cormorant, Cape cormorant, African penguin), vulnerable (Hartlaub's gull, greater flamingo, lesser flamingo, great white pelican) and near threatened (kori bustard, African black oystercatcher, Damara tern, Verreaux's Eagle, Cape eagle owl, black-necked grebe, crowned cormorant) from Namibia (Simmons *et al.* 2015) and the various Palaearctic and other migrants frequenting the coastal areas (e.g. chestnut-banded plovers, black-necked grebe, white-fronted plover, pied avocets, curlew sandpiper, sanderling, ruddy turnstone, grey plover and red knot).

The general area is viewed as an area of special ecological importance in Namibia as it falls within the winter rainfall region and has biotic richness and endemism (e.g. succulent plants, arachnids and insects) and areas of scenic grandeur (Curtis and Barnard 1998). The Lüderitz Peninsula dwarf-shrubland is the most diverse coastal vegetation type with >330 species recorded while the Rocky Coast dwarf-shrubland has up to 60 species recorded (within the quarter-degree square associated with this mapping unit). There are a number of endemic and protected species, many with restricted range and high economic potential for the horticultural trade. Other important species expected and/or known to occur throughout the general area include various *Aloe* spp., various lichen spp. and *Lithop* spp., often associated with rocky habitat.

5 Recommendations

All human induced activities (including exploration) change or are destructive to the local fauna and flora to some or other degree. Assessing potential impacts is occasionally obvious, but more often difficult to predict accurately. Such predictions may change depending on the scope of the activity – i.e. once initiated, may have a different effect on the fauna and flora as originally predicted. Thus continued monitoring of such impacts during the exploration phase(s) is imperative.

General

The following general recommendations are suggested to show environmental sensitivity and commitment regarding the vertebrate fauna and flora should exploration/mining activities in the EPL 7874 realise in future:

Vehicles and Tracks:

1. Avoid unnecessary affecting areas viewed as important habitat – i.e. rocky outcrops; lithops/lichen fields; clumps of protected flora species; dune hummocks, etc.;
2. Make use of existing tracks/roads as much as possible throughout the area;
3. Do not drive randomly throughout the area (could cause mortalities to vertebrate fauna and unique flora; erosion related problems, etc.);
4. Avoid offroad driving at night as this increases mortalities of nocturnal species;
5. Implement and maintain offroad track discipline with maximum speed limits (e.g. 30km/h) as this would result in fewer faunal mortalities and limit dust pollution;
6. Where tracks have to be made to potential exploration sites off the main routes, the routes should be selected causing minimal damage to the environment – e.g. use the same tracks; cross drainage lines at right angles; avoid placing tracks within drainage lines; avoid collateral damage (i.e. select routes that do not require the unnecessary removal of vegetation, especially protected species);
7. Rehabilitate all new tracks created;

Camps and Exploration Sites:

8. Select camp sites and other temporary lay over sites with care – i.e. avoid important habitats (e.g. lichen fields; dune hummocks, etc.) – or bus people in daily from Lüderitz to avoid potential on-site problems;
9. Use portable toilets to avoid faecal pollution around camp and exploration sites;
10. Initiate a suitable and appropriate refuse removal policy as littering could result in certain animals becoming accustomed to humans and associated activity and result in typical problem animal scenarios – e.g. black-backed jackal, crows, gulls, etc.;
11. Avoid and/or limit the use of lights during nocturnal exploration activities as this could influence and/or affect various nocturnal species – e.g. bats and owls, etc. Use focused lighting for least effect;
12. Prevent the killing of species viewed as dangerous – e.g. various snakes – when on site;
13. Prevent the setting of snares for ungulates (i.e. poaching) or collection of veld foods (e.g. tortoises) and unique plants (e.g. various succulent, *Aloe* and *Lithop* spp.) or any form of illegal hunting activities;
14. Avoid introducing dogs and cats as pets to camp sites as these can cause significant mortalities to local fauna;
15. Remove and relocate slow moving vertebrate fauna (e.g. tortoises, chameleon, snakes, etc.) to suitable habitat elsewhere;
16. Avoid the removal and/or damaging of protected flora potentially occurring in the general area – e.g. various succulent, *Aloe* and *Lithop* spp., etc.;
17. Avoid introducing ornamental plants, especially potential invasive alien species, as part of the landscaping of the camp site, etc., but rather use localised indigenous species, should landscaping be attempted, which would also require less maintenance (e.g. water);
18. Remove all invasive alien species on site – e.g. *Nicotiana glauca*, etc. This would not only indicate environmental commitment, but actively contribute to a better landscape;
19. Inform contractors/workers regarding the above mentioned issues prior to exploration activities and monitor for compliance thereof throughout;
20. Rehabilitate all areas disturbed by the exploration activities – i.e. camp sites, exploration sites, etc.;
21. Employ an independent environmental auditor to ensure compliance, especially of the rehabilitation of all the affected areas.

It is not expected that limited exploration activities throughout the EPL 7874 area will adversely affect any unique vertebrate fauna and flora, especially if the proposed recommendations (mitigation measures) are incorporated. However, as EPL 7874 spans very important vegetation types with numerous unique species (including vertebrate fauna), it is recommended that fieldwork be conducted to confirm and/or identify patches of unique species to be avoided/removed, etc. before prospecting commences.

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